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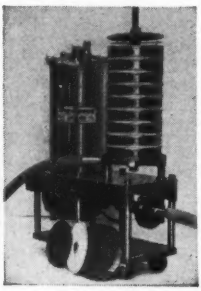

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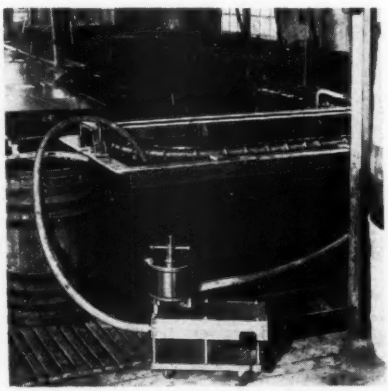

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THE MONTHLY REVIEW

THE COVER

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Carry On!

By CHARLES CONLEY

IN a time which finds all of us changing our ways of living and modifying the plans for our future, it is not beyond reason to expect some changes and modifications in the affairs of the American Electroplaters' Society. With this thought in mind, we recently addressed letters to the Branches, requesting a report on the state of affairs in each Branch. In a few instances where we were in close touch with a few branches, it was unnecessary to write, since their status was well known.

Within the past four weeks, replies to half of our letters have been received. A study of these reports reveals some interesting facts. Almost without exception, the first replies coming in are from those branches, not necessarily larger ones, which have given thought to the needs in a changing world, and have adjusted their program to fit present conditions. In other words they are on their toes.

In some of the Branches which have not reported, activity is at a low ebb. This poses a question like the hen and the egg. Is the absence of activity due to lack of interest, or is the lack of interest due to the absence of activity?

This may be a good place to preach a little sermon to all members, and especially the elected officers of the Branches and the Supreme Society. May we remind you that you are directly charged with promoting the welfare and prosperity of an outstanding international organization. Its standing several years from now will depend to a great extent on what you are doing today to uphold its accomplishments and traditions. Let no elected officer consider his job a purely honorary one with no obligations attached thereto. To be sure, election to an office in the A.E.S. is a mark of distinction, an honor to be coveted. But, it is also a challenge to roll up your sleeves and sail into the business of running your job, in a manner which will be a credit to yourself and the organization which you represent.

Certainly, transportation is bad, speakers are hard to get, and some of the subjects we discussed with great interest in 1940 are stale today. That gives us either a fine excuse to give up and let things drift, or a fine opportunity to bring out the real purpose of this society, to be of service and to educate its members in the new and interesting developments, which have pushed some of the familiar time honored practices into the background. And if I am not a bad prophet, some of them will continue to stay in the background. Let's keep abreast of the new processes that are putting them there.

I have seen branches which were practically dormant, brought to robust, vigorous life when the officers suddenly decided to "do something" about it. I call on every member and every elected officer of this society to "do something" about promotion, and continuing to promote the welfare of the A.E.S. Don't let it be said that the A.E.S. was let down in 1943, because we were not interested enough to put in a few harder licks on our jobs of holding up the interest in this society.

And so ends my sermon.

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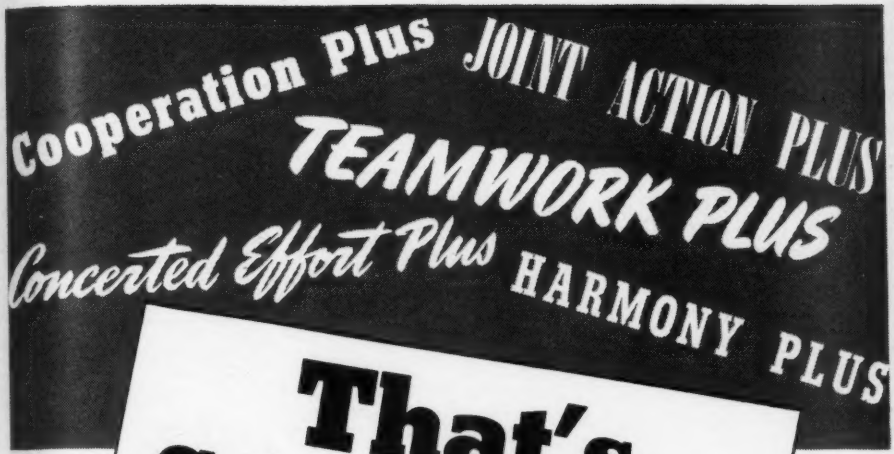

That's Synergism

There's always been a certain amount of industrial cooperation, team work or whatever it might be called. It's existed between departments, companies, industries and has done a lot of good.

But war has shown us that it has to be vitalized, given a whole new outlook, in a word, synergized. The term synergism may be new to industry but it's an old word. Doctor, chemist, theologian have known it. Derived from two classical Greek words, it means, basically, "forces working together to produce a whole greater than the sum of its parts."

If ever "Synergism"—industrially speaking—was needed, it is in these war days and in the peace that will follow. Unheard-of new conditions, the necessity of new products to overcome shortages, the needs of great masses of people, and other factors demand that we get together individually, departmentally and as companies for synergistic thinking and action. Synergism, so applied, will produce great new ideas that will far exceed the results of both thinking separately. This "plus" value, born of minds that "click" truly makes **2 plus 2 equal 5.**

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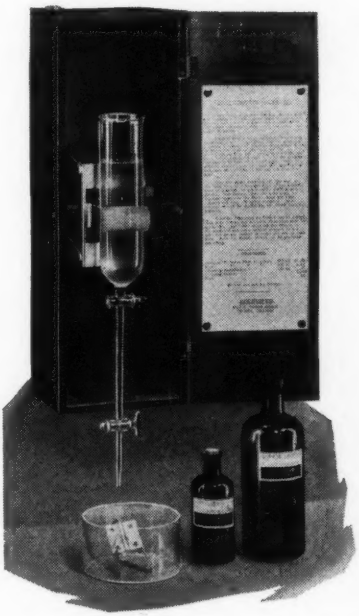

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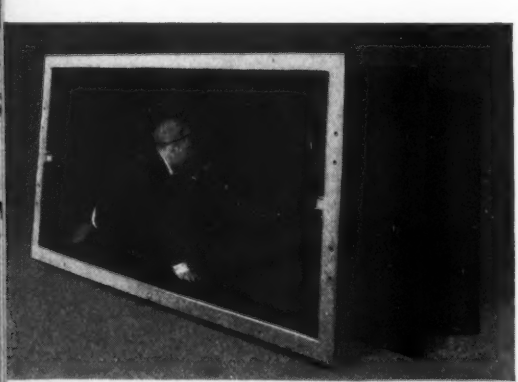

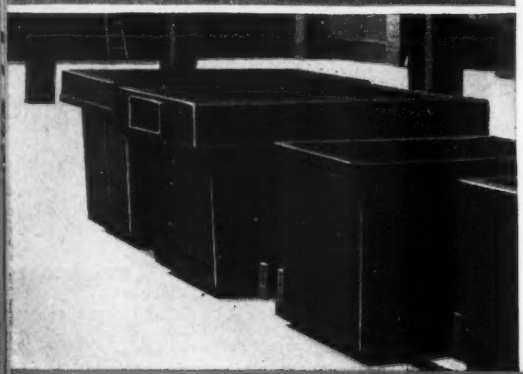

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Availability and Uses of Metals

By JAMES T. KEMP

Metals Consultant, Conservation Branch,
Resources and Production Division, War Department

IT gives me a great deal of pleasure to be with you at this meeting and to contribute the little that I can. I have, I fear, more than the normal mans reluctance to stand up before my brothers and sisters and make talk. On an occasion like this time, care is needed to assemble one's subject matter in suitable form. But I must tell you that when my dear friend, Dr. Blum asked me to speak this evening, all those reluctances vanished. Can any one hesitate to respond to a request from one so well beloved, so generous of his own time, strength and knowledge, so concerned for the welfare of his colleagues in his profession, so earnest a laborer in the cause of Science, so warm of heart? No. One does not resist such a request. One does what the good Doctor asks of him.

Now the subject, Availability and Uses of Metals is a pretty big one. There is a small army of men attached to the several Governmental agencies in Washington at work on this very question every day in the week, trying to forecast needs, to balance one need against another in order that the most pressing may be met, to find substitutes where curtailment or denial of supply will work a hardship, to increase supply, to develop methods, ways and means for stretching what we have over greater areas. Through all this runs a guiding principle; to maintain serviceability and quality, so far as possible, even when degrading standards.

The country's prime wartime needs in metal can be stated in a rough order; this is my own ordering, by the way:

(1) for weapons

(2) for ammunition to supply those weapons

(3) for miscellaneous equipment essential to the welfare and maintenance of men in the Army and Navy

(4) for transport of men, weapons and supplies of all kinds to the theaters of operation

(5) for manufacturing facilities to make weapons, ammunition and other vital supplies and means of transport

(6) for maintenance of the basic national economy

(7) then if anything is left over, for less essential needs of the civilian population

The Division of Conservation, War Production Board has attempted, with no small measure of success, to set up schedules of "Relative Availability of Certain Materials". These schedules or "ladders" are under continual adjustment in the control of each of the critical metals.

The Conservation Division's scheme classifies materials in groups for example, in one group: the Light Metals, Aluminum and Magnesium, Copper and Zinc; in another, Ferro alloys, Basic Iron and Steels and Carbon Steel Products; and separately, Plastics and Fibers and Cordage.

Within each group and under each heading the Conservation Division arranges the products of that critical metal or group in order of availability. Thus the zinc list, from the least available, to the more available runs something like this:

(1) Special and High Grade, as used in Cartridge Brass

(2) Zinc Base Die Castings

(3) Zinc Wrought Products

(4) Zinc for Electroplating

(5) Zinc for Galvanizing and Sherardizing

Now the "Ladder" arrangement, while the authors specifically disclaim it, appears also to rate the availabilities, considering not only supply, manufacturing facilities, military needs (the major cause of the so called shortages) but also possible practical substitutions, and very roughly the relation of zinc with copper, aluminum and other materials. This is a rating largely dependent on judgment. Turning back to the Ladder of November 4th, this list is now old enough to permit limited discussion in a restricted group, we find on a scale of 16, aluminum wrought products occupying the most critical #1 position, zinc for galvanizing the least critical #16 place; high grade zinc, the most critical of the zincs was

in relative position #7 being preceeded by two copper items and four aluminum. High grade zinc was rated equivalent to wrought copper alloys of high purity. Zinc for electroplating is in position #15.

The relations of the metals is so involved that no schematic arrangement has been attempted. The Statistics Division of the Materials Branch, War Production Board has the supply and demand of all basic materials under constant study. Bulletins are issued on a time schedule that calls for reexamination of each at frequent intervals. These bulletins, one page illustrated with graphic diagrams, are invaluable to the planning and conservation efforts. Both Army and Navy have staffs studying these problems for their own points of view. There is a large degree of orderliness about the whole control of critical metals.

The "Materials and Substitution List" and Metals "Ladders" were published in detail in the December number of the A.S.T.M. Bulletin. The controversial feature of numerical positioning of the items in parallel columns was omitted. For example, it is difficult to rate cadmium on a scale that is headed by aluminum wrought metal products. The latter, as everyone knows, are used predominately in airplane construction. Yet the supply of aluminum affects cadmium plating in an indirect way. The two metals are not competitive in the plating industry. Through the aviation industry they are tied together. The airplane construction program runs hand in hand with aluminum supply. Plane building is being stepped up as a result of the enlargement of aluminum production. Cadmium plate is a preferred protection for steel in plane construction. Aluminum production in 1943 may be 3½ times as much as in 1941. The cadmium supply in '43 is not expected to show more than a 20% increase over 1941. 350% vs. 20%. This is an oversimplified statement, admittedly, but it will serve to explain the present activity throughout the Government to substitute more abundant zinc for cadmium, as a protective cover for steel and iron.

The case of copper is more obvious. Copper and more copper is needed for Ordnance purposes. Every use of copper has been examined with the hope of diverting the metal from non-essential civil use, non-military use, non-essential military use to direct essential military use. The most important military use is for cartridge cases. Flow of copper has, therefore, been directed as rapidly and completely as possible to the most obvious need.

The diversion of copper from such important peacetime uses as the base metal of tableware affected silver plating even before the control of silver was attempted.

Tableware, you may be interested to learn, is a matter of great importance to the military. It has been estimated that the Armed and Auxiliary Services of the Government will purchase a few less than 36,000,000 pieces, knives, forks and spoons in 1943. Based on standard patterns this means upward 4,000 tons of metal. Such quantities explain themselves, the substitution began in 1941 for nickel-silver and later for the nickel-chromium steels. It was hoped that a sufficiently durable ware could be made plating silver directly on steel but for the severe service of Army Camp and shipboard we have had to turn back temporarily to the stainless steels. Frozen and distress stocks and odds and ends from the mills are being used. An investigation has been started under the framework of the National Defense Research Committee to develop plated coverings for steel base flatware to replace the alloys. I am happy to say that this enterprise is in the hands of a distinguished member of your society, Professor Hiram Lukens of the University of Pennsylvania, and that two other members are on the Advisory Committee, Dr. Blum and Dr. Graham.

A word about another metal that must be much in your thought, Chromium. Chromium for alloying is "tight". It is under full allocation. At present it is being rationed at about 90% of the demand. Chemical chromium, that is the acid used in plating, the salts used in dying, tanning, for pigments etc., is under limited restrictions, but restrictions not severe enough to embarrass the plating industry on any but luxury work. If chromium plate were really a protective coating it would be used much more. One new use of direct military value for chromium plate has been found. It is the plating of case hardened carbon steel mess trays. Mess trays are really six dishes in one. Men served in camp cafeterias and aboard ship receive an entire meal at one serving on a mess tray. Trays are roughly handled, must have a good measure of corrosion resistance, must not scratch or scar easily. They are now being made by the thousand. My very good friend, Mr. George Hogaboom, a life long member of your society, contributed the art, the practical know-how, that put the chromium plated tray into full scale production over a seemingly endless series of obstacles.

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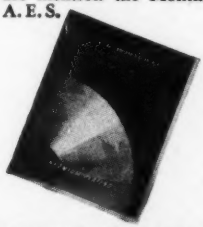

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and malleable iron. Coating is accomplished both by dipping and electro deposition. From the interest shown by the Services it is expected that lead plating will be widely used in place of zinc and coverings of the more critical metals and paint. Lead production has been in excess of requirements in 1941 and 1942. It is expected to be ahead of usage in 1943. A supply, therefore, is assured.

Nickel has all but disappeared from plating for all purposes. Approximately 3% of the nickel supply was used for plating in 1941. With the enlarged supply of this metal to be available after the war, it may be expected that nickel will again become important in plating both for protective purposes, wear and finish.

During the war the greatest importance attached to electro plating must be in the field of protective coating of the base metals. Decorative art in plating has become unimportant temporarily. Decorative art in plating is, nevertheless, being turned to prosaic use. The skill once spent on bronze plating baby's first shoe is now devoted to applying electric conductive coatings on non-metallic materials, in radio and elsewhere. Bright deposits of high reflectivity are being put on base metals for mirrors in lighting equipment where a high intensity beam is wanted.

The industry has suffered, and severely, in the conversion of the country at war. But the losses of the present may well portend gains in the future. Intensified development, exemplified in the case of lead, re-examination of protective value as in the cases of zinc, tin and chromium, specialized work lifting the art of depositing metals from the novelty stage to the utilitarian without loss of the art, all promise well for the future of your industry.

Annual Educational Session of the Baltimore-Washington Branch of The American Electroplaters Society, Washington, D. C. — February 6, 1943.

WANTED:

Plating Chemist or Engineer to take charge of industrial plating in a new plant in Eastern Mass. In replying, state age, draft status, education, experience and salary desired. MONTHLY REVIEW, Dept. 4A.

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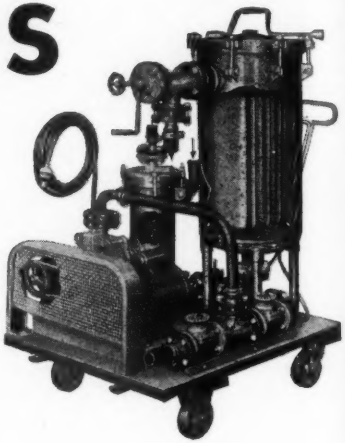

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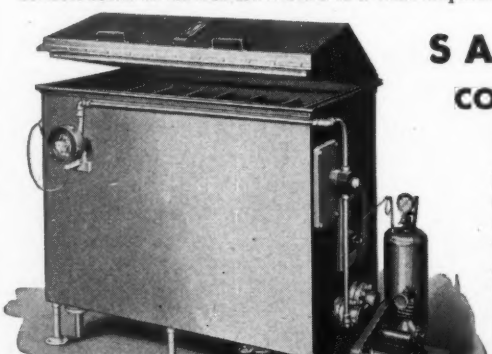

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Burring—Its Rapid Evolution From Hand Methods to Mechanical

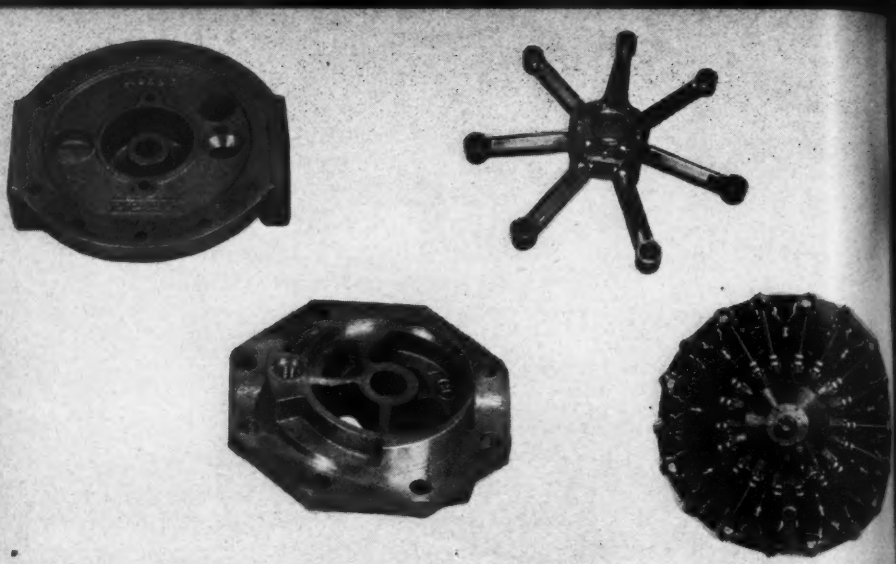
By R. P. CRANE

Vice President, The Lea Manufacturing Co.

BURRING, as a term, is comparatively recent. However burring as such is as fundamental as industry itself. It represents just another method of expressing man's eternal quest for the elimination of friction. Actually burring of a sort has been done for countless numbers of years in many different ways under expressions or terms which undoubtedly hid the actual purpose of the operation. Industry generally has always considered the breaking of sharp edges, the removal of fins, feathered metals and microscopic roughness as desirable but hesitated to incorporate the extra operations into their general manufacturing procedure; First, because their customers did not require such careful preparation, and Secondly, due to the high cost involved in reverting to hand operations which a great many engineers thought at one time was the only way to burr.

However with the development of the Government educational program on the manufacture of armament, many specifications appeared stating, "All Sharp Edges Must Be Broken"; "All Burrs Removed," which awakened an interest in the minds of processing engineers generally, who immediately cast about for all the burring information available. With the impact of December 7, 1941 upon our industrial consciousness, this quest for burring information was greatly implemented by the consequent placing of large Government contracts calling for precision operation throughout. That burring of all uneven surfaces and the breaking of all sharp edges were vital parts of the orders for closer tolerance was, of course, a natural consequence.

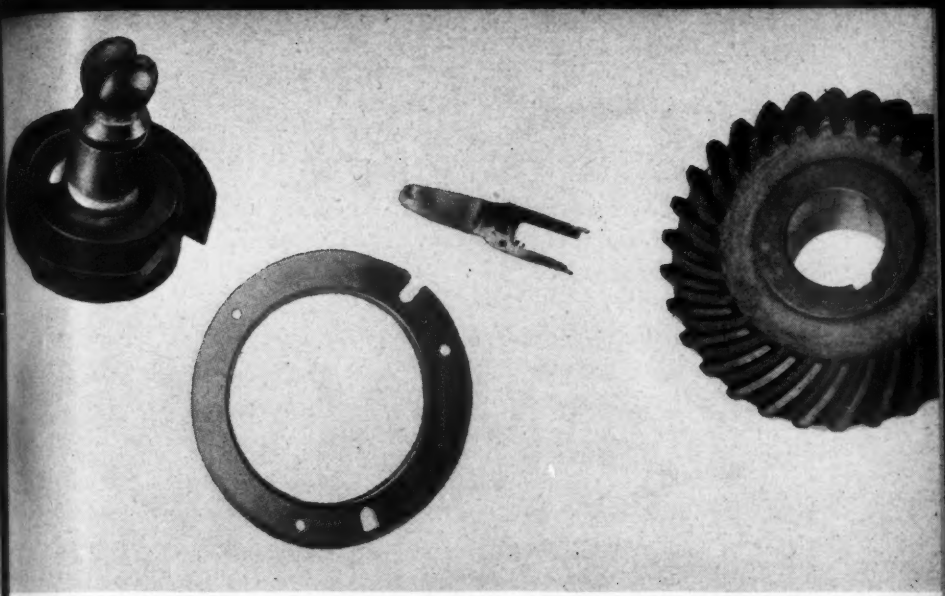
As a great many of the men entrusted with the responsibility of putting these precision operations into effect were, to a great extent, unacquainted with the regular finishing procedures such as rolling, polishing or buffing, and their accessories; the natural tendency was toward hand operations such as filing, hand rubbing with emery cloth, steel scrapers, steel wool, etc. This resulted, in a great many cases, in a



Typical examples of parts bur[illegible]ea Flexi

succession of time consuming, costly operations entailing the use of progressively finer files or emery paper, on the same piece of work before satisfactory results could be obtained. Consequently life for many Production Engineers became a series of bottleneck nightmares with little pink and white files chasing each other around the room striving to catch dollar bills tied to production and cost reports, which in turn were constantly seeking to get out of the room and soar to the sky. This situation obviously called for investigation in order to determine whether or not any of the parts being filed could be done mechanically by a moving vehicle instead of the slow hand operation. Out of this extensive and detailed investigation came a conglomeration of mechanical methods, which were in most cases much faster with a resultant better article. All of these various panaceas have as their major premise the adoption of the moving vehicle as the abrading medium and by so doing eliminating to a great degree the hazardous tendency of the hand operation to be dependent entirely upon the operator's skill. Every one of these various mechanical solutions to the burring problem have a very definite place in the picture and were all undoubtedly discovered as the proper answer to the problem involved.

Under a listing of mechanical operations now being done, it will be necessary to carry them under two subjects, namely Internal and External Burring. The following list of mechanical operations now being done cover either External or Internal Burring, or both.



s burrs. Flexible Method of Burring

EXTERNAL BURRING

Polishing Wheels, (Cloth, Compressed, Felt, Leather)

Polishing Wheels have assumed an ever increasing importance in the burring picture due to the fact that in a great many cases industrial plants were already set up with equipment and accessories, plus trained men who were very competent in handling a large variety of stampings, forgings, die castings, etc. In many cases though it was necessary to impress upon the operators that removal of defects from a decorative standpoint was not the problem, but on the contrary a good, smooth broken edge and the removal of burrs was the dominant factor. This slight difference in technique resulted in considerable emphasis on flexibility in the polishing wheel head. As a result more and more engineers began to speak of "Flexible Polishing" when referring to burring rather than just "Polishing."

Expanding Wheels and Abrasive Belts and Discs

Expanding wheels are used in some cases for flat work of various types, particularly where a sharp wheel edge is necessary, and merely duplicate the polishing wheel technique, though not as flexible, but having the added advantage of being able to renew the cutting head by simply putting on an abrasive belt over an expanding rubber base and

eliminate thereby the removal of the wheel from the lathe and subsequent setting up with glue and emery. Abrasive belts and discs are used where the type and shape of work seems that an abrasion of this nature is advisable. Belts and discs find most of their uses confined to operations wherein the final finish is the important factor rather than the removal of sharp edges and burrs.

Grinding Wheels

Grinding wheels are used in some cases where an initial flash or burr requires a snagging operation and is of such a type that other methods would not be suitable for completely removing the roughness. However these operations are generally followed by some variation of the methods as outlined herein.

INTERNAL BURRING

Mounted Points

Mounted points which consist of various grades of artificial abrasive in many grit sizes made up into varied shapes of cones, bobs, pencil points, etc., are used to a great extent for internal burring operations, particularly in machine shop forging departments. These items do an excellent job and have fine abrading characteristics but do suffer in many cases from a progressive build-up of powdered metal becoming lodged between the grain and decreasing the cut. Mounted points are also available in abrasive impregnated rubber which are extremely flexible.

Rotary Files

Power driven files of this type are used primarily where filing is the essential operation and speed of operation is a factor. Filing generally, whether mechanical or hand, usually leaves the metal surface not quite as smooth as would be the case if an abrasive medium were used. This results in some cases in a hand emery-cloth operation following the last file or one of the mechanical methods as listed.

EXTERNAL AND INTERNAL BURRING

ROLLING

"Rolling" is undoubtedly the method under which the greatest single

volume of burring is carried out. Where extreme precision or a variation in tolerance on different areas of the same piece is not a factor, rolling can accomplish unbelievable results in greater volume and faster than any known method. With new rolling techniques and equipment available, this method should be investigated carefully by everyone having burring difficulties before considering other solutions to the problem. Its adaptability to both Internal and External burring simultaneously and production potential are its greatest assets.

Wire Wheels

Wire Wheels have an extensive application to the burring problem, particularly where smoothness must be obtained in deep recesses and without leaving any foreign substance behind. Their application to the "Internal" field is generally confined to small special shaped types operating on flexible power tools. Their ability to reach both sides and the bottom of some work simultaneously is regarded as essential. And with other methods it might be difficult to remove abrasive material or other foreign substances.

Tampico Wheels

Tampico because of its ability to abrade with extreme flexibility and still retain fairly well the various grease emery compositions used upon it, finds great favor in many places where cleanliness is not a factor and subsequent cleaning operations would result regardless. They have a very limited application, in the very small sizes, to Internal burring due to the necessity for having an abrasive medium as a dressing on the brush. The inability of the fiber to properly retain dry greaseless heads precludes their use in many instances where extreme flexibility, fast cutting and cleanliness would be desirable.

SAND-BLASTING — EXTERNAL

This method of burr removal is used primarily where a sand-blast cleaning is also a part of the procedure and burring can be also taken care of at the same time. From a production standpoint, the necessity of protecting finely machined internal surfaces on otherwise suitable articles for a sand-blasting operation preclude a wide use of this efficient process for burring, particularly on small parts.

Flexible Polishing

Flexibile polishing consists of the development of a dry, flexible abrasive cutting head on moving vehicles of all types including polishing wheels, loose buffs, sewed buffs, string brushes, felt wheels, bobs and cones, and maintained by periodic applications from a bar of patented greaseless compound. The ability of an abrading medium set up in this manner to get into inaccessible places and around sharp corners without destroying tolerances and without transferring any dirt or grease to the working surface, makes this procedure perhaps second to none in importance on burring problems today. By the constant renewal of the cutting head without stopping the power, the operator is able to continue hour after hour uninterrupted by changing wheels, etc. Many Internal burring jobs can be done very effectively by the use of felt bobs and cones of varied shapes upon which the flexible abrading head is greaseless compound, applied to a felt bob mounted on a flexible power tool with speeds ranging from 15,000 to 100,000 r.p.m. available. The setting up of a cutting head wherein the abrasive grain is floating in the greaseless binder and not firmly fixed, such as with the usual glue and emery setup wheel, plus a completely clean working surface at all times, produces a result which is not obtainable by other methods.

Knowledge of some interesting factors concerning the type and conditions of metal to be burred oftimes make it possible to simplify the burring operation. For instance, steel in the green state is very difficult to burr as it has a tendency to roll over and does not shear clean, but retains a toughness. By the addition of a hardening operation subsequent burring is considerably helped as hardening itself will remove in some cases quite a few burrs and the remainder shears very quickly without any tendency to roll over.

Bronze and Rich Low Brass and some types of Aluminum castings are also difficult to burr by the use of an abrasive medium in view of the fact that these metals impregnate very easily and care must be taken to insure that no abrasive transfers from the wheel to the work, particularly in the case of Bronze where the metal itself becomes an abrasive lap and naturally would not be suitable for operations of a frictional nature.

Many ordnance, aircraft and precision items formerly hand burred which are now successfully mechanically processed include machine gun parts, propeller parts, autosyn motors, precision instruments, air-

craft motor baffles, aircraft motors, gear teeth, tank and tractor parts, time fuse rings, detonators, filters for aircraft, Dural and Alclad sheet and countless other materials too numerous to mention.

With the tremendous increase in efficiency obtained by these fine burring operations, despite the fact that as opposed to previous industrial processes, they amount to additional operations; industry generally is more than pleased with the better operation and longer life obtained from their units in the field. Aircraft assemblies and motors particularly emphasize the removal of all sharp edges and burrs as the elimination of all these points of friction have made it possible to obtain greater horsepower output and longer hours in the air before complete overhauling. Aircraft filters also find it absolutely essential that all burrs must be completely removed from their working parts as loose metal carried through to oil supply lines would be disastrous.

Although these stringent government specifications have given many an engineer a few more gray hairs, the overall increase in the quality of our war industry materials as contrasted to those of our enemies, has justified this strict adherence to what at first looked like essential time wasted.

The manner in which the finishing industry rose to meet the challenge of these new requirements by the development of speedy mechanical methods in place of hand operations is a tribute to typical American resourcefulness and the policy of never admitting that anything cannot be improved.

With the added experience of the past year many of these mechanical burring methods are being continually improved, and burring, as a term, is reverting to a place as merely another industrial expression rather than the frightening boogey-man it appeared to many production men in the past.

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The Fundamentals of Electrochemistry and Electrodeposition

Part XVIII. Conditions Affecting the Form of Electrodeposited Metals

By SAMUEL GLASSTONE, D.Sc., Ph.D.
Professor of Chemistry,
The University of Oklahoma, Norman, Okla.

FACTORS AFFECTING NATURE OF DEPOSIT

IT was seen in the previous article (Monthly Review, March 1943) that good deposits of metallic silver can be obtained from cyanide solutions, but that such deposits are not obtainable from solutions of silver nitrate. There are numerous instances in connection with electrodeposition in which the conditions of plating make a considerable difference in the physical appearance and other properties, such as hardness, of the deposit. It is, therefore, a matter of fundamental importance to try to understand how the nature of the plate is affected by the conditions of electrolysis. The whole problem is undoubtedly very complex, but there are certain generalizations which can be made that provide at least a partial solution. Electrodeposited metals are undoubtedly crystalline in nature, and the form of the deposit depends largely on two factors; first, the rate of formation of crystal nuclei by the discharge of the ions at the cathode, and second, the rate at which these nuclei grow into large crystals. If the conditions are such as to favor the rapid formation of fresh nuclei on the cathode, the deposit will tend to consist of small, fine-grained crystals. The plate will then be smooth and relatively hard; this is the case in the ordinary plating of silver, nickel, chromium, and so on. On the other hand, if the circumstances are such that the nuclei increase in size rapidly, the deposit will consist of relatively large crystals and will be rough in appearance. The separation of silver from silver nitrate solution evidently takes place under such conditions. Sometimes electrodeposits are spongy or powdery in character; the crystals are then small, but the presence of an impurity probably prevents them from adhering to form a continuous plate.

There are undoubtedly many factors, not all clearly understood, that influence the two processes referred to above, namely, formation of crystal nuclei and their increase of size, but five at least may be considered. These are (1) current density (C.D.), (2) concentration of the electrolyte, (3) temperature, (4) presence of addition agents, and (5) nature of the electrolyte. These factors will be considered in turn.

CURRENT DENSITY

At low C. D.'s the discharge of ions occurs at a slow rate; there is thus ample time for the crystal nuclei to grow, and the formation of fresh nuclei is unnecessary. The deposits obtained under these conditions should be coarsely crystalline. As the C. D. is increased, the rate of discharge of the ions will increase and fresh nuclei will tend to form; the plate will then consist of smaller crystals. Increase of C. D., within limits, will therefore yield deposits that are more fine-grained. There is, however, a definite limit to this improvement, because at very high C. D.'s the crystals tend to grow out from the cathode toward regions where the solution is more concentrated; in this way "trees" or nodules are ob-

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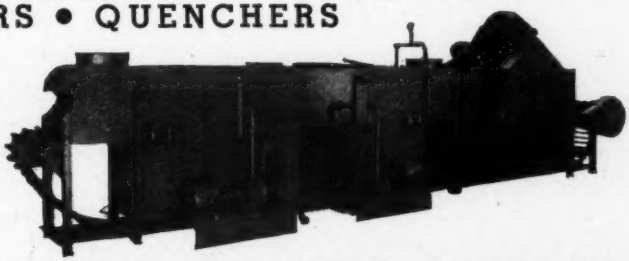

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tained. Further, at high C. D.'s there may be considerable discharge of hydrogen ions, thus causing the solution in the cathode layer to become alkaline and precipitate hydroxides or basic salts. The inclusion of appreciable amounts of these substances in the deposit may make the latter fine-grained (see below), but it will be dark in color, i.e., "burnt", or spongy in character. Further, the evolution of hydrogen gas is often accompanied by the formation of spots and streaks on the plate.

CONCENTRATION OF THE ELECTROLYTE

Increase of concentration can largely offset the bad effects of high C. D.'s. By increasing the concentration of the solution, or by the use of agitation, it is possible to postpone until much higher currents the harmful effects, such as tree formation, and burnt or spongy deposits, accompanying the use of high C. D.'s. Since in commercial electroplating it is desirable for the sake of economy to work at the highest practicable C. D.'s, the bath solution should be as concentrated as is reasonable and some form of agitation or stirring should be employed. Under these conditions, the solution near the cathode does not become impoverished in the ions to be discharged (see Part XVI), and there is little tendency to form trees, dark deposits, etc. Some electrochemists have expressed the opinion that concentrated solutions are desirable because they favor the formation of fresh crystal nuclei and hence are inclined to give fine-grained deposits. However, there is experimental evidence which indicates that the rate of formation of crystal nuclei is actually decreased by increasing the concentration of the electrolytic bath. The fundamental improvement in the appearance of the deposit, which often occurs, is due to an increase in the rate of growth of the crystal nuclei over the surface of the cathode, while the rate of growth at right angles to the surface is decreased. It can be readily imagined that this would have the effect of yielding a flat and smooth deposit.

EFFECT OF TEMPERATURE

Increase of temperature appears to have two effects which oppose one another. In the first place, diffusion of ions to the cathode is favored, so that the formation of rough deposits, due to impoverishment, is largely prevented On the other hand, the rate of growth of the crystal nuclei is increased, and so the deposit will be inclined to become coarse. In addition, increase of temperature decreases hydrogen overvolatge and so

facilitates the discharge of hydrogen ions; for this and other reasons the formation of basic salts occurs more readily. At moderate temperatures, such as are often employed in nickel plating, the first of the three aforementioned factors predominates, and so the deposits are improved. At higher temperatures, however, deterioration is observed.

INFLUENCE OF ADDITION AGENTS

In many instances, for example, the deposition of lead from acetate solution, silver from the nitrate solution and tin from a chloride solution, the metal normally deposits in the form of fairly large crystals that are useless for ordinary plating purposes. The presence of quite small amounts of certain organic substances, such as sugars, camphor or some coal-tar derivatives, or of colloidal matter, such as gelatin, ager, glue, rubber or casein, often results in a surprising improvement; the deposits become smooth, fine-grained and micro-crystalline, instead of being rough and consisting of large crystals. Very small amounts of the addition agent are generally sufficient to produce the desired improvement, and if too much is added the deposit may become loose and powdery or brittle. Although the action of a particular added substance is often specific for a given metal, there is probably one fundamental reason that applies to all cases and which accounts for the formation of fine-grained deposits. The addition agents are generally substances that have a high surface activity; that is to say, they tend to adhere to, or rather to be "adsorbed" by, the surface. If the colloid or other substance attaches itself to the surface of the crystal nucleus and covers it, as it has a strong tendency to do, the further growth of the nucleus will be prevented. When ions are discharged they are thus compelled to start fresh nuclei, and the result is that the deposit is fine-grained, whereas it might otherwise have been coarsely-crystalline. The deposits obtained in the presence of addition agents have in fact been found to contain a certain proportion of the latter, as might be expected from the fact that they tend to coat the crystal nuclei. It is easy to understand, too, how an excess of addition agent can cause the deposit to become brittle; since the crystals are covered with a relatively thick layer of the added substance, the deposit will tend to break apart at the surfaces separating the crystals.

Nickel generally forms smooth deposits in sulfate and chloride solutions even in the absence of addition agents, and there is good reason for this behavior. The deposition of nickel is always accompanied by the simultaneous discharge of hydrogen ions, and so the electrolyte tends

to become alakline near the cathode, thus leading to the formation of oxide or basic salt. By interfering with the growth of the crystal nuclei, these substances act just like addition agents, and cause the deposit to become smooth and fine-grained. It is a significant fact that the ordinary electrodeposits of nickel have been shown to contain appreciable amounts of oxides, as they should do if the theory is correct.

NATURE OF ELECTROLYTE

The nature of the electrolyte, as in the case of silver deposition, often has a very profound effect on the appearance of the deposit. Other cases similar to that of silver are the following: lead deposited from acetate or nitrate solutions is rough, but smooth deposits are obtained from silicofluoride and borofluoride solutions; fine-grained deposits of tin are produced from stannate baths, but from stannite baths they are of poor quality. There seems little doubt that in nearly all, if not in all, such cases the explanation of the improved deposit lies in the formation of colloidal matter which is adsorbed on the surface and so interferes with the growth of the crystal nuclei. Consider the deposition of lead, for example; in nitrate or acetate solution there is either no formation of colloidal material or, if it does form, it is unable to affect the growth of the nuclei. In silicofluoride and borofluoride solutions there is the possibility of the formation of colloidal silica and of boron trioxide, respectively, which presumably prevent the nuclei from increasing in size. Similarly, in the electrodeposition of tin, the formation of colloidal stannic oxide occurs in the stannate bath and this causes the deposit to become fine-grained.

SILVER AND CHROMIUM DEPOSITION

In the previous article mention was made of the theory that the smooth plate of silver that is obtained from cyanide solutions is due to the discharge of a positive complex ion Ag_2CN^+. After neutralization of its charge at the cathode the resulting radical will split up immediately into silver and silver cyanide. If some of the latter, which is deposited with the silver, adheres to the crusted nuclei in amounts just sufficient to prevent their rapid growth, the production of the familiar smooth micro-crystalline deposits can be easily understood. In the nitrate solution there is nothing to interfere with the growth of the silver nuclei, and so the plate consists of relatively large crystals.

The best deposits of chromium are obtained from solutions of chromic acid containing small amounts of sulfate ion. It is highly probable that the very fine-grained deposits are due to the formation of an insoluble complex chromic chromate; this tends to cover the cathode and so prevents the crystal nuclei of metallic chromium from increasing in size. The function of the sulfate ion is apparently to affect the nature of the insoluble layer so that it does not completely block the cathode. In this way the growth of the crystals is hampered, but access of ions to the cathode is not prevented.

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H-VW-M Mercil Type Centrifugal Dryers are described in Bulletin CD-101.

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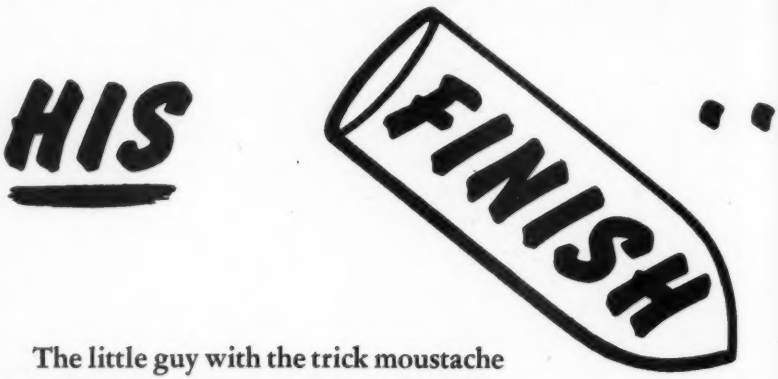

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If each one of us, sometime during the whole year of 1943,

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(Or even if *1 in 10* of us succeed in doing so) . . .

We'll NEED a fresh start — and a QUICK start — to KEEP UP with the *Peace-time* PACE. Is there a member who will proclaim his inability to do that? Come to the Buffalo Convention in June, and tell your fellow members what you think.

Illustration courtesy
of H. K. Lorentzen, Inc.

DETROIT PROPOSES AMENDMENT

The Detroit Branch wishes to propose an Amendment to the By-Laws to clear up the present Section on Awards, as follows:

Proposed Amendment: Section 10 of Article IV of Part I of the By-Laws shall read as follows:

> Committee on Papers' Awards. The President shall apopint before each convention the Chairman and members of the Committee on Papers' Awards who shall be active or associate members of the Branches. This Committee shall be governed by permanent rules on Paper Awards which are to be appended to these By-Laws. Any change or departure from these rules shall be effected by application of the Committee Chairman for approval by the Executive Board. Any change in the awards to be made shall, on approval of the Executive Board, become automatically a part of the permanent rules. The Committee shall make selections for such awards and announce their decisions during the Annual Convention or as soon thereafter as practicable.

This is for the consideration of your Branch, so that your delegates to the National Convention may be properly instructed.

WRIGHT W. WILSON, *Acting Secretary-Treasurer*

MILWAUKEE HOLDS ANNUAL MEETING

The Milwaukee Branch of the American Electroplaters Society will hold its annual Educational Meeting and Banquet at the Schroeder Hotel, Milwaukee on Saturday, April 24, 1943. All members and those interested in electroplating are cordially invited.

The Educational Session will be held in the Pere Marquette Room at 2 P.M. The program is in a tentative stage but it will include Mr. Lewis of the Northwest Chemical Co., of Detroit, Michigan, who will present a paper on "Micrographic Studies of Surface Preparations." Walter Pinner and Gus Soderberg will also speak but they have not yet chosen their subjects. Admission to the Educational Session will be free.

The Banquet will take place in the Crystal Ball Room at 7:00 P.M. Music and entertainment are under the supervision of Harry Uncke who has provided these features for several previous banquets. Admission will be $3.50 per plate and tickets may be obtained from the Secretary of the Committee.

DIVINE BROTHERS WIN ARMY-NAVY "E"

Divine Brothers of Utica, N. Y., long identified with the electroplating industry were awarded the coveted Army-Navy "E" October 17th.

In response to the notification from Robert P. Patterson, Under Secretary of War, Mr. B. D. Divine wrote:

The Honorable Robert P. Patterson
Under Secretary of War
War Department
Washington, D. C.

Dear Mr. Patterson,

Your letter of October 17th telling us of the Army-Navy "E" production award is a document which will take its place among the treasured archives of our company.

A small company of less than 200 people, we are deeply appreciative that our small contribution to the total war effort has seemed to you to be worthy of this high honor.

We do not, however, intend to rest on our laurels. The little we have thus far been able to accomplish will only serve as a real incentive to redoubled effort on our part towards the main objective – the winning of the war.

Very sincerely yours,

B. D. Divine, *President*

NEWARK ANNUAL MEETING

Newark Branch will hold its annual Educational Session on May 1st, 1943, at the Hotel Robert Treat, Newark, N. J., at 7:00 P.M.

The Educational Session will consist of Motion Pictures by the Aluminum Company, to be presented by Mr. Ralph E. Pettit. A talk on Zinc Plating by Mr. Floyd Opplinger of E. I. du Pont de Nemours Company, and a talk on Deburring by Mr. Robert R. Sizelove of Frederick Gumm Chemical Company, will comprise the remainder of the program.

The Banquet will be eliminated, but refreshments will be served after the meeting, for which there will be no charge, nor will there be a charge for admission to the Session. Members of other Branches are cordially invited to attend.

George Wagner, *Secretary*

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Good welding is planned welding, with every detail considered that will contribute to continued and uninterrupted service. Storts engineers have long specialized in construction that outlasts expectations, with particular attention to avoiding early corrosion failures.

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This high quality fabrication is definitely not a luxury today, whether your requirements are for plain tanks, lined tanks or special accessory equipment.

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BRANCH NEWS

Business and Social News · Educational Activities

PLATING OF MAGNESIUM

The Armed Forces need information concerning plating on magnesium. Any member who has had any such experience is requested to write to the Secretary.

PHILADELPHIA BRANCH

Philadelphia Branch held its regular monthly meeting February 26th at the Harrison Laboratory, University of Pennsylvania.

President Verrell opened the meeting and turned the gavel over to the Librarian, Henry G. Orlik, who introduced the speaker of the evening, Mr. MacIntyre, of the Cleveland Laboratory of the E. I. du Pont de Nemours Co.

Mr. MacIntyre had all the necessary equipment for his demonstration of the use of the Hull Cell. Practical tests of solutions, brought by our members, were made and a demonstration of how one may read the samples plated in the cell.

The Speaker held the interest of the 35 to 40 members present until a late hour, and there were not many who did not have some questions answered; about, either the Hull Cell or the samples plated. The President called for a rising vote of thanks to Mr. MacIntyre and due to the lateness of the hour, adjourned the meeting at 11:10 P.M.

The Board of Managers recommended the election of Herman A. Miller, Frederick G. Stubbs, and George A. Taylor, Associates.

The application of Emilio J. Marrero, Associate, was referred to the Board of Managers.

The Board of Managers recommended the payment of the bills.

PAUL MENTZER, *Secretary*

CINCINNATI BRANCH

The Cincinnati Branch held its meeting February 25th at Hotel Gibson. Our go-getter, President Harry Miesner, opened the meeting with an all-out pep talk for the Regional Meeting, which I am sure will go over as Harry has been to Dayton and has just about gotten in touch with everybody that he could. We have quite a few reservations already in and are looking for more as the time grows closer.

Our greeters welcomed in the new members.

The meeting was then turned over to Dr. Mathers, of Indiana University, who gave a very interesting talk. He also showed many samples of the rarer elements. Dr. Mathers has talked to us before but each time he has something that really makes you sit up in wonder when he gets all of them.

AL. FOREMAN, *Secretary-Treasurer.*

BUFFALO BRANCH

The regular monthly meeting was held Friday, February 12, 1943 in Parlor C of the Hotel Statler. The meeting was called to order by President Ruff at 8:10. The minutes of one January meeting and the Treasurer's report were read and approved.

We were reminded by Bill Fotheringham that the ladies' committee was without a chairlady. Dr. Wernlund moved

The Rackote Division, Wyandotte Paint Products Co.

A timely booklet has recently been prepared by The Rackote Division of Wyandotte Paint Products Company, Wyandotte, Michigan. This booklet stresses the important part the plating industry is playing in America's war production.

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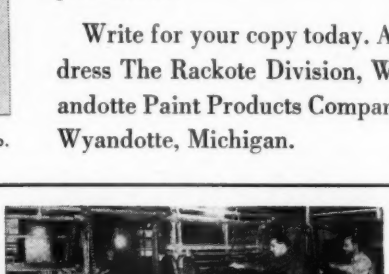

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FOR PLATING AND ANODIZING
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CLEVELAND OHIO

that Mrs. Hart be chosen to fill this post. The motion was seconded by Don Rice and carried unanimously.

The meeting was then turned over to Dr. Wernlund who read us a letter from Candee indicating that the National officers had contacted the O.D.T. for permission to hold our Convention this June. He then introduced our speaker for the evening, Mr. McIntyre, of the Grasselli division of duPont who proceeded to give us a practical demonstration on "The Use of the Hull Cell for Testing Plating Solutions."

"Mac" tested several samples brought in by members. One zinc solution showed signs of lead contamination. Precipitation of the lead produced a remarkable improvement in the quality of plate and increased the current range in which a smooth deposit was obtained. The rest of the solutions were operating satisfactorily as indicated by the tests and confirmed by the members who had brought them.

The necessary experience for spotting trouble in any given solution could be quickly obtained by any plater as follows:

1. Make one or more test panels of the solution when operating as it should.

2. Make test panels of the solution after having added various impurities which might be encountered in actual practice.

3. Save these test panels to compare with future tests.

Interest in the subject was extremely keen if we can measure it by the questions, but "Mac" handled them all with a skill that showed a thorough knowledge of the subject acquired only by a very broad experience.

After a rising vote of thanks by the members and the scheduling of a Convention meeting for Tuesday, February 16, 1943, the meeting was adjourned at 11:00 p.m.

JAMES C. MAYS, *Secretary*

ROCHESTER BRANCH

The Rochester Branch of the A. E. S. held the regular monthly meeting at the Hotel Seneca, February 19, 1943. The meeting was called to order at 8:30 by President John Q. Adams.

The minutes of the previous meeting

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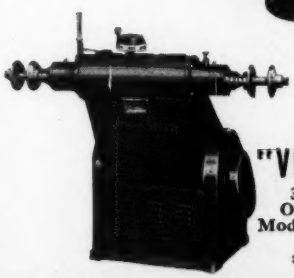

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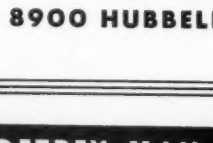

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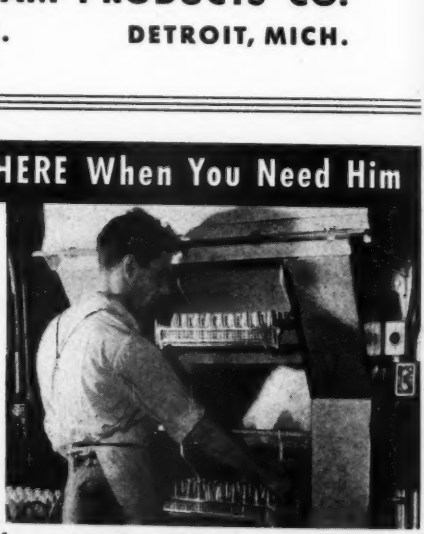

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were read and approved and the financial report was also read.

To stimulate attendance, the members voted to have next month's meeting at the Rochester Turners with dinner served previous to the regular business meeting.

The meeting was then turned over to Mr. Gerald Lux, graduate of the University of Rochester, who is an honorary member of our Branch. Mr. Lux was formerly at the Bureau of Standards in Washington and spoke on his activities there. Jerry had a fine collection of experiments on corresistance test, salt spray and atmospheric conditions of plated specimens. The atmospheric and salt spray tests were as follows: by polishing a steel sample on 90 emery down to 320 emery then to a superfine finish. The samples or specimens were then degreased, electro cleaned then plated under very elaborate methods in order to maintain proper uniform thickness, and even distribution of the plate. The atmospheric conditions were made possible by placing specimens on top of buildings in Washington, California and New York.

We of the Rochester Branch are indeed very proud to have Jerry Lux for an honorary member of our Branch. Most of the members were present to greet him personally and to thank him for the most interesting evening he provided.

The meeting was adjourned at 10:45.

DONALD BLUM, *Secretary*

CHICAGO BRANCH

The regular monthly meeting of the Chicago Branch was held Friday, March 12th, at the Atlantic Hotel.

First Vice President, R. J. Hazucha, presided and all other officers were present.

A letter from the Detroit Branch regarding an amendment to the By-Laws for the Committee on Paper Awards was read and laid over till our April meeting.

A letter from the Buffalo Branch regarding displays was read and referred to Mr. R. Hazucha as Chairman of this Committee.

Mr. L. C. Borchert, acting as Guest Librarian, introduced the Speaker of the evening, Mr. H. I. Hansen, of the E. I. du Pont de Nemours & Co., who is also a member of the Chicago Branch. Mr. Hansen made a very fine, interesting and instructive talk on the "Sulfamate Lead Plating Process." This process should be a big help to those members who are called on to do lead plating, as Mr. Hansen made it sound very simple to operate and control and answered many questions asked by those present.

The sound motion picture "Building a Bomber" for (U. S. Army) was both interesting and instructive. There were 75 in attendance and the meeting adjourned at 10:30.

J. W. HANLON, *Secretary*

TOLEDO BRANCH

The regular monthly meeting of the Toledo Branch of the A.E.S. was held on Thursday evening of Feb. 4th, at the Hilcrest Hotel in Toledo, Ohio, with 20 members and all officers present.

The President, Mr. Vannorsdall, presided over the meeting, which was called to order at 8:20 P.M. The minutes of the previous meeting were approved as read. Two applications were made for reinstatement of membership, one application for membership was made and approved. Letters from acting executive secretary, Mr. Candee, and from the Newark Branch, concerning change in name and increase in scope of the A.E.S. were read and discussed, and disposed of without a formal vote. The prevailing sentiments expressed during the discussions were along about the same lines as those expressed by the Newark Branch in their letter. Bills were read and ordered paid.

Mr. Miner received a telephone call from Barney Case, who was to have been the speaker for the evening, informing him that he had taken ill about 4:30 o'clock that same afternoon, and would not be able to attend the meeting for that reason.

Mr. Vannorsdall lead an informal but very interesting discussion on the experiences of hard chrome plating, taking into consideration different base metals, heat treating, cleaning, etching, bright plate porous plate, hydrogen embrittlement, prevention thereof before plating and the relief thereof after plating, several mem-

bers with experience in hard chrome plating took part in the discussion which lasted about two hours.

Meeting adjourned at 10:45 P.M.

G. P. H. BERGEMAN, *Secretary*

NEWARK BRANCH

The regular meeting of the Newark Branch of the A.E.S. was held on Friday evening, February 19, 1943, at the Hotel Robert Treat in Newark, N. J. The meeting was called to order at 8:30 P.M. by President William Bruhns. Other officers present were: George Wagner, Secretary-Treasurer, John DeVries, Sarg-at-Arms, and Horace H. Smith, Board of Managers.

The minutes of the previous meeting were read and approved.

Application for Howard F. Johnson to Associate Membership was voted to take the regular course.

Mr. Harold S. Kelshaw, Eugene M. Silverbach, James J. Allen and Charles E. Bloom were elected to Associate Membership.

Under Committee Reports, Mr. Smith and Mr. Bruhns reported that it was decided at a recent committee meeting to hold our Special Educational Session on Saturday, May 1, 1943 and that a very appropriate program was in the offing. There will be no admission charge to this meeting. Further details will be reported at a later date.

As there was no Guest Speaker for the evening and our Librarian being absent, Mr. Byron Hogaboom, a member of our Educational Committee, was called upon to conduct a Question Box. Numerous questions were asked on Zinc Plating, Chromemating, Anodizing, Salt Spray Tests and many others. It would have been well if we had a stenotyper to take down all the information. Byron was given a rising vote of thanks for his efforts by the 28 members present.

There being no further business the meeting was adjourned at 11:00 P.M.

GEORGE WAGNER, *Secretary*

DETROIT BRANCH

Detroit Branch held its March meeting at the Hotel Statler on Friday evening, March 5th, with about 100 members and friends present.

Mr. V. M. Darsey of the Parker Rustproof Company was the speaker for the evening. His subject was "applications of Phosphate Rustproofing in War Industries." In his talk he outlined the various methods used in producing the phosphate coatings. Also the trade names of these coatings and applications of the same in the War time manufacturing processes.

There were a large number of questions in the question box, and Mr. Darsey was kept busy answering them for almost as long a time as his paper took.

Detroit Branch is sponsoring an Amendment to the Constitution and By-Laws this year as the members feel that the provisions for Awards can be interpreted differently than the intent of the sponsors, and should be corrected.

Our April meeting will have as speaker, Mr. Frank Savage, of C. G. Conn., Ltd., and a movie, "The Story of a Spark Plug."

WRIGHT W. WILSON
Acting Secretary-Treasurer

SAN FRANCISCO BRANCH

The monthly meeting was held on February 25th at Angelo's in Oakland: Preceeded by an enjoyable dinner the meeting was called to order at 8:30 P.M. by the new President Frank Cavallera.

The financial statement, as of date of transfer, was read by the new Secretary-Treasurer and accepted. The new officers, as elected at the former meeting were announced and the duties as librarian are to be divided between the acting President and the Secretary-Treasurer.

Mr. Fred W. Huntington, as guest speaker, offered a very interesting discourse having as his subject the large variety of plating methods as practiced at the Alameda Naval Air Station where he is the guiding force. His remarks on hard Chrome surfacing, heavy Silver plating, Eliminating Hydrogen embrittlement after plating were accompanied by a lively discussion among the fifteen members present.

A very pleasant gathering adjourned at 11:00 P.M.

A. KISTLER, *Sec.-Treas.*

BOSTON BRANCH

Boston Branch met Thursday, the 4th of March, at the Statler Hotel, Boston,

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1—750/375 AMPERE, 6/12 VOLT, **BENNETT & O'CONNELL ELECTRIC CO.** Motor Generator Set. Full Panel-Board Arrangement. Excellent Condition.
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with President Swift in the Chair.

Minutes of the previous meeting were read and approved and bills were read and ordered paid.

One application was read for the second time and approved by the Board of Managers and he was elected to membership – Philip V. Bray, 874 Pleasant Street, East Weymouth, Mass., Associate.

A report was made by Robert Smith on the coming banquet. He stated that the banquet will be held April 10th at the Manger Hotel, Boston. He asks all the members to support the Committee this year with conditions as they are. This will be more important than ever so we hope that every member will try to attend.

Wesley Cassell spoke on the coming regional banquet to be held this year at Hartford, May 1st. Boston will be there.

With all regular business out of the way the Chair was turned over to our Librarian, Lou Gagnon. His speakers were Mr. Irby, Mr. Grover, and Mr. Clark of the General Electric Co., of Lynn, Mass.

Mr. Grover spoke on "Hard Chrom. Plating," on machine tools and dies.

Mr. Irby and Mr. Clark gave a demonstration of "Silvering Reflector Mirrors." All explained the methods of doing this work from start to finish. They answered all questions for the members and were given a rising vote of thanks for their interesting talks.

Meeting adjourned at 10:30 P.M.

A. W. GARRET, *Secretary*

CLEVELAND BRANCH

Minutes of the meeting of the Cleveland Branch of the American Electroplaters Society held in the Cleveland Hotel on March 6, 1943.

The meeting was called to order at 8:45 P.M. with President, William E. O'Berg, in the chair.

The minutes of the February 6, 1943, meeting and the treasurer's report were read and approved.

The following applications were read and then referred to the Board of Managers:

Eugene W. Hauck of Cleveland, Ohio, as Active. Joseph L. Unocic of Cleveland, Ohio, as Active.

Under election of members the following whose names were read at the January meeting and which were published in the February issue of *The Monthly Review* were elected:

Ernest V. Collins of Cleveland, Ohio, as Active. Ben H. Brand of Cleveland, Ohio, as Active.

A communication from Mr. James A. Moneypenny, Chairman of Displays, for the Annual Convention to be held in Buffalo next June, was read and referred to Mr. J. Singler. There was also read a letter from Mr. Wright W. Wilson, Acting Secretary-Treasurer of the Detroit Branch, outlining an amendment entitled "Committee on Paper's Awards" to be submitted at the 1943 Annual Convention.

There was announced that our Librarian had been successful in securing Dr. Wm. Phillips of the General Motors Corp. to speak to us on Friday night, March 19, on Plastics and their Relation to Plating. It was decided to invite the members of the Cleveland Branch of the Electro Chemical Society to hear Dr. Phillips talk.

Mr. Stephen F. Miller as chairman of the Dinner Dance committee gave his report. Needless to say this was a most successful affair and a good time was had by all.

There being no further business, the meeting adjourned.

GEORGE B. SVENSON, *Secy.-Treas.*

LOS ANGELES BRANCH

The Los Angeles Branch held its regular monthly meeting March 1 at the Elks' Club, 607 So. Parkview.

After a very good dinner the meeting was called to order by President E. R. Holman.

Minutes and financial reports were read and approved. Bills ordered paid.

Two letters were read. One from exhibit chairman of the Buffalo Branch and one from the Detroit Branch for amendment to the constitution for awarding prizes for papers. No action was taken on these. They were turned over to the Chairman of the Board of Managers.

Mr. Marcus Rynkoff, Chairman of the Committee for the Educational Session and Dinner Dance reported that every-

thing was going forward for the biggest annual session ever attempted by the Los Angeles Branch and anyone planning to attend should make reservations as early as possible to assure good tables.

The meeting was turned over to Librarian, J. P. ApRoberts who introduced Mr. Ray Bray, who gave us some very good points on zinc plating. Pure anodes and proper balance are very essential and with some brightener and sodium sulfide should produce a very good plate. Watch anode connections, sulfide will take care of roughness. Cooling system should be installed where bath is in use 24 hours per day.

Bob Gripp revealed his learning on filtering. He said sulfide should not be added to tank but should be mixed with a reasonable amount of solution in another tank and filtered. Glass bags are no good for zinc. Anode bags cut down amperage as they get older. This talk and discussion could have taken up the entire meeting, every one was so interested.

Mr. ApRoberts then introduced Mr. F. Carl Hirdler, Jr., Process Engineer for Turco Products, Inc. He gave us a talk on Chemical Surface Treatment for Steel, which was sent to *The Review*.

The meeting adjourned at 10:30.

C. C. MCLAREN, *Secretary*

PITTSBURGH BRANCH

The Pittsburgh Branch of the American Electroplaters' Society held their regular meeting Thursday, March 4th, at 7:00 P.M. at the Fort Pitt Hotel. The dinner was followed by the business meeting and educational program at 8:30 P.M.

There were 18 present for the dinner and 22 present for the educational program which was quite a drop from last month's total of 48. Extreme bad weather and an announced Blackout, however, undoubtedly were largely to blame for the poor turnout. The minutes of the previous meeting were read and approved. A lengthy discussion on the place of the next meeting finally ended in favor of holding the April meeting at the Fort Pitt Hotel again for a dinner meeting. With so many of our members coming from out of town, the dinner meeting affords these out-of-town men a chance

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of getting together during the meal as well as after for the meeting. Suggestions for the next meeting program were in favor of a speaker on "Control Materials Plan" or a practical talk on Hard Chrome by Mr. G. A. Jersey of our Branch.

The Aluminum Company of America presented three sound films on Aluminum telling of the romance of its development, its manufacture and its uses. A lecture by Mr. Pettit of the Aluminum Company and an elaborate display of aluminum finishes completed the program.

F. R. KELLER, *Sec'y.*

BRIDGEPORT BRANCH

The regular monthly meeting of the Bridgeport Branch of the American Electroplaters' Society was held Feb. 5, 1943 at 8:00 P.M. at the Chamber of Commerce Rooms, Stratfield Hotel. President Charles McElroy opened the meeting with 24 members present.

The roll call of Officers was read and B. F. Kusterer member of the Board of Managers was reported absent. The minutes of the previous meeting were read and accepted.

No special committees appointed at this time.

Technical Session Committee reports to entertain with a round table discussion.

Sick Committee Chairman F. B. Gotthardt reports sprays sent to the families of B. F. Kusterer and Charles McElroy in their recent bereavement. Cards were received by the Branch thanking the members for their kind expression of sympathy.

Membership Chairman R. J. O'Connor reports two prospective men for membership. Will report progress at the next meeting.

Letters were sent to the members of the Bridgeport Branch asking for their comments by mail or in person regarding the change of name of the Society. It was agreed by all members present to resume this business at the next meeting for a thorough discussion and a final decision.

Mr. Floyd Erlenmeyer was transferred to the Bridgeport Branch for the Newark Branch as an Associate member.

Bills against the Branch were ordered paid.

The treasurer's report was read and accepted.

The Educational Session was turned over to our Librarian, C. C. Helmle, who conducted a round table discussion on various problems and difficulties encountered in the Plating industry. Considerable information came to light in the exchange of information and suggestions offered by the various members of the Branch.

Meeting adjourned at 11:00 P.M.

JOSEPH G. STERLING, *Secretary*

LANCASTER BRANCH

The Lancaster Branch met Friday evening, February 12th, at 8 o'clock at the Stevens Trade School. The secretary read the minutes of the previous meeting.

Harold Fisher was suspended for nonpayment of dues. The names of Raymond Nissley and William McComsey were handed to the Membership Committee to see if they could collect their dues.

The Chairman read a letter from our National President stating that he may pay us a visit in the future.

At the January meeting it was decided to have Local Talent Night in February so in the absence of our Librarian, our Chairman introduced Norman J. Gebert who spoke on "Hydrogen Embrittlement." R. L. Hoenstine who spoke on "Corrosion of Zinc and H. L. Hovis who spoke on "Oxide Finishes on Steel," also Chris Brubaker who finished by speaking on the "Old Time Plater vs. the Modern Plater."

WILLIAM H. FORDNEY, *Sec.-Treas.*

MILWAUKEE BRANCH

The 337th regular meeting of the Milwaukee Branch was held February 5th at the Republican Hotel.

Mr. Rodney Olsen, who has spent some time in the hospital, returned to action and presided over the meeting.

Mr. Olsen appointed the following committee for our banquet and educational session to be held April 25, 1943; Education—Mr. William Geissman, Hotel and Menu—Mr. Philip Ritzenthaler, Publicity—Mr. Vincent Sheehan, Entertainment—Mr. Harry Unke, Advisory—

Mr. Frank Marx, Treasurer—Mr. Robert Steuernagel, Jr., and Chairman—Mr. Al Hermansen.

Mr. Axel H. C. Johnson was elected an associate member.

Mr. William Geissman opened the educational session by introducing Mr. Clindinin of the Crown Rheostat Co. who spoke on Rhoto Finishing and displayed samples that were deburred by the Rhoto method. This method of deburring has a great advantage over wheel burring or filing because it cuts time with quantity finishing. Although limited in some cases it has speeded up war production in a number of plants. According to Mr. Clindinin it is the coming method of finishing metals for plating and otherwise.

Mr. Clindinin's talk was given a hearty vote of approval. After the meeting adjourned, lunch and refreshments were served.

Among the Milwaukee Branch members present at the Chicago banquet and educational meetings were Mr. R. Steuernagel, Sr., Mr. Robert Steuernagel, Jr., Mr. W. Geissman, Mr. Ray Goodsell, Mr. R. M. Goodsell, Mr. Robert Goodsell, Mr. J. Miszewski, Sr., Mr. Roman Binder, Mr. Henry Binder, and yours truly. These members and the other members who attended wish to express their appreciation for the fine educational sessions, dinner dance, and entertainment.

JAMES DURNFORD, *Secretary*

GRAND RAPIDS BRANCH

Grand Rapids Branch held its regular meeting at the Browning Hotel, February 12th, which was attended by 75 friends and members.

The meeting was opened promptly at eight o'clock by our President, Homer Morton. All business was transacted, communications read. Four new members' applications were presented, voted upon and elected.

Wilbur A. Hallburg, J. C. Scharmer, John D. Jakle, Gustav H. Walgren.

Our Librarian then introduced the two speakers, Mr. Charles Cahn and Mr. Harold Erstrom of the Colonial Alloys Co., who were the speakers for the eveing. Mr. Cahn's discussion covered plating aluminums, anodizing Aluminums, strengthening and improving aluminum

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alloys, joining aluminums, anodizing magnesium, and his subject included new non-chlorinated solvent degreasing methods and materials. An open forum was conducted on the above subjects and the speakers answered several questions concerning their processes.

The Hotel then served refreshments, and the meeting was then adjourned.

C. E. ABEL, *Secretary*

WATERBURY BRANCH

Waterbury Branch held its regular meeting, February 12, 1943 at the Hotel Elton. Dinner was served at 6:30 P.M. in the Colonial Room and promptly at 8:00 P.M. Vice President Carl Kilborn, in the absence of President Ralph Colter, opened the technical session. Fifty-six were present.

The application of Harry O. Streeter having been accepted by the Board of Managers, it was voted that he be made an associate member of the Branch.

It was regretted that John Carr, due to sickness at home, was unable to assume the duties of Technical Chairman, as scheduled, however Tony Max substituted in a very creditable manner.

Bill Starr in a brief summary, diverged somewhat from priorities to rationing, speaking of the shortages of food, bus service and oil, but pointed out that it is entirely permissable and desirable to use your car to attend educational meetings, such as our Branch meetings and the Regional meeting, May 1st. Of course, your car should only be used if necessary and every effort should be made to carry a full load of passengers.

Jack Hyner, commenting on methods of measurement for specification plating, suggested the microscope as having the most universal application and for a beginner wishing to acquire knowledge of the best procedures, the book Practical Photomicrography, by Barnard and Welch is a very desirable text.

Ellsworth Candee advised that the Supreme Society is giving consideration to the publication of a book or series of books on electroplating. It has been suggested that the articles written by Glasstone in *The Review* be reprinted as a text book, followed by other books of about 100 pages covering specific subjects, which could be revised easily and brought up to date from time to time.

The moving picture was "The Care and Cleaning of Plexiglass," furnished by Rohm and Haas Company. This new plastic, clearer than glass, has taken its place wherever vision is required in an airplane. This film showed how to maintain and repair Plexiglass right in the field with a minimum of tools and equipment.

Dr. C. B. F. Young was the speaker of the evening, talking on "Black Oxide and Phosphate Coatings on Steel." Dr. Young has made an extensive study of these coatings, their uses and limitations. He reviewed each of the various processes, now on the market, in detail and pointed out where oxide coatings and phosphate coatings fitted into the war picture. We are always glad to listen to Dr. Young and in this talk he was in his usual good form. Numerous questions were ably answered. At the close of the meeting, Dr. Young was given a rising vote of thanks.

S. L. HENN, *Secretary*

NEWARK BRANCH

The regular meeting of the Newark Branch, A.E.S., was held on Friday evening, December 4th, 1942, at the Hotel Robert Treat in Newark, N. J. The meeting was called to order at 8:00 P.M. with President William Bruhns presiding. All other officers were present.

The minutes of the previous meeting were read and approved.

A communication from George B. Svenson, Secretary of the Cleveland Branch was read and placed on file.

The Secretary announced that Mr. Charles Proctor, Founder of the American Electroplaters' Society, passed away on December 3rd and that funeral services would be held Sunday afternoon, December 5th, 1942 at 3:00 P.M. at Collings Funeral Parlor, Kearny and Bergen Avenues, Kearny, N. J. It was voted that a flower piece should be sent to the Funeral Parlor, expressing the sympathy of Newark Branch and that as many members as possible should attend the services.

Mr. Horace Smith once more reminded the members of our Christmas Party, which is scheduled for the 19th of December. Mr. Wm. Bruhns read the letter which was drafted by the Investigating

Committee of the proposed and defeated amendment. He stated that this letter was being forwarded to the *Monthly Review* for publication in the January issue.

Mr. William T. Maguire, Librarian, next presented Dr. Weber and Mr. L. E. Eckelmann as Guest Speakers for the evening. Dr. Weber's subject was "Industrial Hygiene" and Mr. Eckelmann's subject was "'Phosphating and Bonderizing." Both subjects were very interesting and numerous questions were asked which kept the speakers on their feet until 11:45 P.M. Both speakers were given a rising vote of thanks by the 49 members present.

The meeting was adjourned at 11:50 P.M.

GEORGE WAGNER, *Secretary*

NEWARK BRANCH

The regular meeting of the Newark Branch, A.E.S., was held on Friday evening, February 5th, 1943, at the Hotel Robert Treat in Newark, N. J. The meeting was called to order at 8:30 P.M. by President William Bruhns. All officers, with the exception of Bob Sizelove and John Kotches, were present.

The minutes of the previous meeting were read and approved.

Communications from the Bridgeport Branch and Robert R. Sizelove were read and placed on file.

Application for Joseph Gruszkiewics to Associate Membership was voted to take the regular course.

Mr. Horace Smith reported that he, George Klink and George Wagner had visited John Kotches and that his condition was improving steadily. John wishes to thank the members for the contribution which was sent to him by the Committee.

The question of whether or not to hold a Banquet this year was brought up and after some discussion it was decided to eliminate it and in place of same to hold a special Educational Session. Mr. Smith was elected Chairman with the perogative to appoint his own Committee.

The Guest Speaker for the evening was Dr. Gernstedt of the Westinghouse Company. His subject was "Speedier Ananlysis of Plating Solutions." Dr. Gernstedt explained to the group in detail how they accomplished the analysis of their own

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plating solutions in a few hours, which formerly required three to five days. His subject was very interesting and he was given a rising vote of thanks by the 32 members who attended.

The meeting was adjourned at 11 P.M.

GEORGE WAGNER, *Secretary*

ROCHESTER BRANCH

The Rochester Branch of the A.E.S. held the regular monthly meeting at the Rochester Turners Club; with a delicious Fish and Steak dinner served at 6:30, previous to the regular business session.

The business was called to order at 8:30 by President John Q. Adams.

The minutes of the previous meeting were read and approved and the financial report was also read. Communications received by the Secretary were read and acted upon.

Two applications for new members were presented and approved. Our new members are Mr. Robert L. Flint and Mr. Fred C. Wagner.

The meeting was then open to the members for a discussion period. Questions were asked and answered on Hard Chrome Plating, Tungsten Plating, Iron Plating, Anodizing of Aluminum and Magnesium. The discussion proved very worthwhile and beneficial to the members.

The meeting was adjourned at 10:00.

DONALD BLUM, *Secretary*

TORONTO BRANCH

The regular meeting was held March 12th at the Royal York Hotel. President Boaz in the chair.

Allan Byers read report of the Annual Dance, which proved to be most successful. A hearty vote of thanks was given to the Committee consisting of Joe Fitzsimmons, Tom Boaz, Allan Byers and George Harris.

Four applications were ballotted and elected into membership as follows: David M. Hamilton, Ben J. Cameron, Russell L. Sutherland and W. A. Trott. One resignation was received. John Acheson reported that Tom O'Keefe was in the Westeren Hospital. The members were sorry to hear this.

Nominations for election of officers took place with a few changes. Election will take place at the next meeting.

A letter was read from Buffalo about the next Convention.

Under the heading of Good and Welfare, Chairman Boaz called on J. S. Cairns as speaker of the evening, his subject being "Architectural Iron & Bronze." Twenty-nine samples were shown of all different colors, which drew quite an interest by the members. Mr. Cairns answered many questions and received a hearty vote of thanks.

President Boaz reminded the members of the Card Party March 19th.

JAMES S. CAIRNS

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THE ABSTRACT SECTION

GEORGE WAGNER

Chairman Program and Educational Committee

Acid Zinc Plating. By ERNEST H. LYONS, Jr. *Trans. Electrochemical Soc.* **80** (Preprint 16) (1941). Per dollar of coating cost, zinc coatings confer more protection for iron and steel than any other metal, in virtue of the intrinsic corrosion resistance of zinc combined with its capacity for protecting steel electrolytically, and it is primarily for this protection that it is applied. Compared to hot dip methods, electroplating offers at least equal protection for a given thickness of coating, more ductile coatings which do not crack or "dust" on bending and forming, superior uniformity on many shapes, greater range of coating thickness with accurate control thereof, ability to coat screw threads without filling them (but it fails to "solder" seams and joints), and absence of heat treatment which may warp or change the temper of steel. Compared to cyanide baths, acid baths have a higher rate of deposition and lower bath and maintenance costs, and will plate on malleable and cast iron; but they lack high throwing power. Various applications are listed, including large tonnages of strip steel and wire. The following formulas are given:

No. 1			**No. 2**		
Zinc sulfate, $ZnSO_4.7H_2O$ . .	32	oz./gal.	Zinc sulfate, $ZnSO_4.7H_2O$ . .	48	oz./gal.
Ammonium chloride, NH_4Cl	2	"	Ammonium chloride, NH_4Cl	4	"
Aluminum sulfate, $Al_2(SO_4)_3.18H_2O$	4	"	Sodium acetate, $NaC_2H_3O_2.3H_2O$	2	"
Licorice	0.13	"	Glucose	16	"
No. 3			**No. 4**		
Zinc sulfate, $ZnSO_4.7H_2O$ . .	54	oz./gal.	Zinc sulfate, $ZnSO_4.7H_2O$ . .	32	oz./gal.
Aluminum chloride, $AlCl_3.6H_2O$	3	"	Sodium acetate, $NaC_2H_3O_2.3H_2O$	2	"
Sodium sulphate, Na_2SO_4 . .	10	"	Aluminum sulfate, $Al_2(SO_4)_3.18H_2O$	4	"
			Licorice	0.13	"

Cathode current density	10-30 amp./sq. ft. (except in special cases)
Temperature	75-85° F., or higher
pH (electrometric)	3.5-4.5
Current efficiency	95-100%
For barrel plating.	
Zinc sulfate, $ZnSO_4.7H_2O$	72 oz./gal.
pH (electrometric)	not less than 5.0.

Continuous filtration is helpful. Most metal impurities are automatically precipitated on the anodes during idle periods. The bath attacks the zinc anodes chemically until the pH rises to about 5; in operation, small quantities of sulfuric acid must be

added to lower the pH, and the small amounts of zinc sulfate thus formed approximately compensate for drag-out losses. Operation with insoluble anodes is also outlined, but is not generally used or recommended. Analysis of the bath is rarely required; methods are briefly suggested. Traces of tellurium, nickel, antimony, germanium, and nitrates are objectionable. Anodes may be of prime Western spelter, intermediate grade (99.5% zinc), or high purity (99.9% zinc). Ordinary cleaning methods are generally suitable before plating, but must be thoroughly accomplished, as must the rinsing, since the detergent properties of cyanide baths are lacking. Overpickling must be avoided, especially with castings. Special cleaning methods have been developed for stubborn soils on cold rolled steel and wire. The avoidance of hydrogen embrittlement and blistering is described. The corrosion resistance is proportional to the coating thickness; specifications are outlined. The salt spray and Preece tests have little meaning; the microscope test for coating thickness is standard but inconvenient; magnetic, or stripping or dropping tests, which are described, are recommended. Properly plated zinc is ductile, soft, and adherent, and may retain its brightness longer than hot dip zinc coatings.

Tin Plating from the Potassium Stannate Bath. By MARTIN M. STERNFELS and FREDERICK A. LOWENHEIM. *Trans. Electrochem. Soc.* **82** (Preprint 24) (1942). Observations of properties of potassium stannate solutions are reported which indicate that these baths have advantages over the sodium stannate baths for tin plating. For equal tin contents, potassium baths are more conductive and show higher cathode efficiencies than the corresponding sodium baths, although the difficulty of obtaining reliable cathode efficiency measurements in stannate baths is admitted. However, the advantage of potassium stannate lies chiefly in the fact that, according to solubility measurements reported, it is much more soluble than sodium stannate, and consequently baths may be made with much higher tin content than is possible with the sodium salt. Further, higher temperatures may be employed, since, unlike the sodium bath, the potassium bath does not deposit solid stannate at high temperatures. Not only is the conductivity very substantially increased, but the cathode efficiency is much improved: one bath, operated at 194° F. is reported to have shown a cathode efficiency of 78% at 1000 amp./sq. ft. In anode efficiency, however, potassium baths are inferior, although this may be improved by increasing the caustic (potash) content, at some sacrifice in cathode efficiency. The critical current density for forming the requisite yellow-green film at the anode appears to be higher for potassium than for sodium. No significant difference in the quality of the plate was observed. It is suggested that baths suitable for any given condition be selected from the curves given: for example:

Potassium stannate	500-525 g./l.	67-70 oz./gal.
Tin content	190-200 g./l.	25-27 oz./gal.
Free KOH	100 g./l.	13.4 oz./gal.
Temperature	90° F.	194° F.
Anode efficiency	84% } at 150 amp./ft.	
Cathode efficiency	82% }	

It is claimed that the addition of acetate is of no advantage in either potassium or sodium baths. It is stated that potassium baths lose less tin and form less sludge by hydrolysis than sodium baths. The potassium baths are, however, more costly than sodium, because they are more concentrated and because potassium is more expensive than sodium.

THE QUESTION BOX

LOS ANGELES BRANCH

What is a good brightener for zinc after it is plated, something like cad.?

Ans. Chrome dip will give you tan streak but will increase protection.

How can nickel be removed from a cad. solution?

Ans. Add more cad. or Plate out.

To desludge bottom of the tank can we take suction through a long pipe inserted into the bottom for the filter pump?

Ans. Take hose, put down to very bottom. It will suck it out.

How to change a regular chrome bath to hard chrome?

Ans. 33 oz. chromic, 128-130 degrees.

What is a durable dull black finish? By Army and Navy specifications?

Ans. No specification for steel. 57-0-2b for salt spray.

What makes nickel pit and how can it be overcome?

Ans. Add nickel salts. (Peroxide) (P.H. off).

How can we keep zinc cyanide fog from condensing on the anode bar and dripping back into the tank contaminating it with copper?

Ans. Rubber in between zinc or nickel bars.

What causes work to come out dark in the zinc barrel?

Ans. No satisfactory answer.

What is the Dykman process for oxidized film on cad?

Ans. Commercial dye.

Will there be any War Bonds for prizes at your Banquet?

Ans. Yes, several.

C. C. MCLAREN, *Secretary*

DETROIT BRANCH

The Detroit Branch of the American Electroplaters Society held the usual Question Box at the meeting on February 5th. The following questions were submitted.

Are there any health hazards in sulfamate lead plating?

Ans. The solution is poisonous if taken internally and may be absorbed through the skin if allowed to remain in contact with it. It is not corrosive nor are any disagreeable fumes given off.

Is a copper flash always recommended for use with a sulfamate lead plating process?

Ans. A copper flash is not always necessary but is probably always desirable. A copper strike can reduce the thickness of lead necessary to produce a pore free coating and consequently increase corrosion resistance. The minimum thickness required without copper is about .0005" while with copper only .0003" is required. Good coatings with high corrosion resistance can be produced from lead coating without copper. The use of copper under lead very definitely aids soldering.

Is electro lead plated sheet steel available on the market?

Ans. Lead plated steel is not yet available but several firms are said to be experimenting with the idea.

What kind of tank is most suitable to hold sulfamate lead baths?

Ans. Almost any tank but steel or lead will hold this solution. Some temporary installations have even used lead linings but this can only be of a temporary nature.

Is anyone using lead plating followed by Indium plating for bearings?

Ans. Quite a few firms are using this method at present but apparently in a small way. Whether this will be adapted to production remains for the future to demonstrate.

Is lead plating satisfactory for electrical equipment where contacts are involved?

Ans. Lead would probably be satisfactory for contacts except at high voltages where arcing is involved.

When welding lead plated steel do you still have satisfactory corrosion resistance at weld?

Ans. So far only spot welding has been used. In this case the lead seems to seal over the weld and the corrosion resistance is not impaired.

EDGAR A. HAHN, *Librarian*

LOS ANGELES BRANCH

How much agitation is desirable for zinc plating?

Ans. 5 or 6 ft. per minute enables you to use higher C.D. and get a brighter plate.

Why don't you use glass bags in the zinc solution?

Ans. Glass bags are hard to get. Concern in East makes them, $1.40 1 bag. Not all glass is caustic resistant.

Effect of iron impurity in bright zinc solution? How removed if harmful? Tolerance?

Ans. Zinc dust will remove copper, lead and cad. Sodium sulphate will remove iron (and filter).

What is a water soluble oil?

Ans. Water soluble oil is one where water is used as the base.

I want to tin plate. What is a good formula?

Ans. From floor, Guide Book.

What makes my zinc plate rough?

Ans. Impurities in solution, perhaps lead, iron or cad.

How to dispose of several hundred gallons of cadmium cyanide solution when changing from cad. plate to zinc plate?

Ans. Solution can be evaporated but it would be best to plate out all the cad. possible first.

What does silica content do to the zinc bath? Does it foul the anodes?

Ans. No one has had experience with silica contamination.

What causes silver to deposit on steel anodes in silver strike? How can it be prevented.

Ans. Remove anodes when not in use.

What anode ratio is best in zinc solution?

Ans. 1 to 1 anode to cathode.

How do you reduce caustic content in zinc solution?

Ans. Dilute and build back or let run down by working.

C. C. MCLAREN, *Secretary*

PITTSBURGH BRANCH

How can one plate chrome on a high carbon (2%) steel that is passive?

Ans. Sand blast if possible — eliminate anoding if possible and start at high current density.

What are some of the good non-conductive materials that can be used in a chrome solution?

Ans. Micarta, glass, porcelain, resin films such as bakelite and stop off laquers.

What is meant by heat treating of chrome plate?

Ans. Heating to a temperature of 300-450° F for one half to two hours or infrequently to as high as 600° C to eliminate hydrogen embrittleness.

How high can chrome plate be heated without grain growth of the chromium?

Ans. Up to at least 1000° F.

Is chromium harder or softer after heat treatment?

Ans. Slightly softer.

Is it necessary to interrupt the plating where chromium is to be .025 inches thick?

Ans. It is frequently done to make a safer job.

How is chrome plated over chrome?

Ans. Remove the film of chromium oxide by a dip in HCl until gasing starts or by anoding in CrO_3.

Is CrO_3 or H_2SO_4 the better anoding solution?

Ans. CrO_3 is usually preferred to eliminate the rinse and dragin.

What effect does copper have if present in the solution?

Ans. It reduces the conductivity of the solution.

What causes flaking of part of the plate when plating .005" of chromium?

Ans. This could be caused by poor cleaning or an interruption of the current.

FRANK R. KELLER, *Secretary*

BOOK DEPARTMENT

BOOK REVIEWS

By

DR. GEORGE DUBPERNELL, *United Chromium, Inc.*

Lacquer and Synthetic Enamel Finishes. RAY C. MARTIN. 526 pages. D. Van Nostrand Company, Inc., New York, New York, 1940. Price, $5.50.

To a field having a dearth of satisfactory textbooks, this book is a welcome addition. For this reason it seems worthwhile to review here, even though it was published several years ago. The title seems much broader than the scope of the book, which relates almost entirely to nitrocellulose lacquers. With this qualification, it appears to be an excellent primer or introductory text for those beginning a study of the subject. The advanced worker in this field would probably be disappointed if seeking specific information on his particular work.

The first chapter of nine pages covers a "Genealogy" or brief history of nitrocellulose lacquer. Chapter two discusses the constitution and production of Cellulose Nitrate and Acetate, and makes some mention of a few other materials. Chapter three is an excellent brief description of the commonly used Solvents. Chapters four, five, and six relate to Plasticizers, Resins, and Pigments respectively. Chapter seven on Plant and Equipment is well illustrated and includes some discussion of fire prevention.

Chapter eight covers Requirements, Types, Formulation. The requirements of nitrocellulose lacquers for various special purposes are discussed. A high point of the entire book is at the end of this chapter where the author gives his formulas for about forty-four different lacquers for definite uses.

Chapter nine on Analytical Methods – Laboratory and Field Tests seems especially well done. It is eighty-two pages long and should be particularly helpful to anyone engaging in tests of these materials for the first time.

Chapter ten gives brief discussions of a number of Faults and Corrections arranged in alphabetical order for easy reference. The next chapter is on "Applications," by which is meant methods of applying, as spraying, brushing, dipping, etc. Chapters twelve and thirteen cover Furniture Finishing and Motor Car Finishing. The final chapter is a Glossary of over one hundred pages covering the terms used in this field. The book is well indexed.

★ ★ ★

(1) **Standard Handbook for Electrical Engineers.** Edited by A. E. KNOWLTON and R. M. SHOOK. 2303 pages, $8.00.

(2) **Cleaning and Finishing Metal Products.** Published by Iron Age. 235 pages, $3.00.

(3) **Modern Metallurgy for Engineers.** By Frank T. Sisco, 432 pages, $4.50.

(4) **An Introduction to Electrochemistry.** By SAMUEL GLASSTONE. 553 pages, $5.00.

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Chairman, Membership Committee

To January, 1943

ELECTIONS

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PHILIP V. BRAY, Tubular Revet & Stud Co., Wollaston, Mass., Associate

Buffalo Branch

MR. MAU, Keystone Chrome Corporation

Chicago Branch

E. W. RICKMEYER, 216 Indiana Ave., Elmhurst, Ill., Active
J. E. BUDOVEC, c/o Jefferson Electric, Bellwood, Ill., Associate

Cleveland Branch

ERNEST V. COLLINS, Chromium Corp. of America, Active
BEN H. BRAND, General Hard Chrome Co., Active

Detroit Branch

CLIFFORD AXSOM, 1099 Van Dyke, Apt. 23, Detroit, Mich., Associate
GEORGE H. RUSS, 743 N. Waverly Dr., Dearborn, Mich., Associate
BRYANT W. POCOCK, 696 Beec St., East Lansing, Mich., Associate

Grand Rapids Branch

WILBUR A. HALLBERG, Chief Metallurgist, Kalamazoo Stove & Furnace Co., Associate
J. C. SCHARMER, Norge Div., Borg Warner Corp., Muskegon Heights, Mich., Active
GUSTAV H. WALGREN, c/o J. C. Miller Co., Grand Rapids, Mich., Associate

Hartford Branch

ANTHONY FRASCARELLA, Hartford Chrome Corp., Hartford, Conn.
HAROLD J. DOOLEY, Du-Lite Chemical Corp., Middletown, Conn.
HAROLD BISHKO, Du-Lite Chemical Corp., Middletown, Conn.
EARLE B. LEWIS, Du-Lite Chemical Corp., Middletown, Conn.

Los Angeles Branch

JOHN L. DAMON, General Chemical Co., Los Angeles, Calif., Associate
GILBERT J. YONTZ, The National Supply Co., Los Angeles, Calif., Active
ARCHIE J. PEVERLEY, National Supply Co., Los Angeles, Calif., Associate

Newark Branch

HAROLD S. KELSHAW, The Matchless Metal Polish Co., Glen Ridge, N. J., Associate
EUGENT M. SILVERBACH, Fidelity Chemical Products Corp., 430 Riverside Ave., Newark, N. J., Associate
JAMES J. ALLEN, Eastern Aircraft, Division of General Motors, Associate
CHARLES E. BLOOM, Fidelity Chemical Products Corp., Newark, N. J., Associate

New York Branch

DAVID GARFINKEL, 850 W. 176th St., New York, N. Y., Associate
WILLIAM PRINTZ, 45 W. 34th St., New York, N. Y., Associate
BARNET OSTROW, c/o Benrus Watch Co., Inc., 30 Cherry Ave., Waterbury, Conn., Associated, *REINSTATED*

Philadelphia Branch

GEORGE A. TAYLOR Victory Division, R.C.A. Mfg. Co., Philadelphia, Associate
HERMAN A. MILLER, Argo Mfg. Co., Philadelphia, Associate
FREDERICK G. STUBBS, R.C.A., Victor Division, R.C.A. Mfg. Co., Inc., Philadelphia, Associate

Pittsburgh Branch

J. M. KULCHAK, R.D. No. 3, Coraopolis, Pa., Active

Rochester Branch

ROBERT L. FLINT, Bldg. 43, E. K. Co., Kodak Park, Rochester, N. Y., Associate
FRED C. WAGNER, 257 Bakerdale Rd., Rochester, N. Y., Associate

Toronto Branch

ALBERT V. CLARE, 18 Maple St., Weston, Ont., Associate
GEO. W. McFARLANE, 36 Dennison Rd., E., Weston, Ont., Associate
HENRY M. SUTTON, 763 Millwood Rd., Toronto, Ont., Associate
DAVID L. HAMILTON, 42 Ritchie Ave., Toronto, Ont., Associate
B. J. CAMERON, c/o American Electroplating Co., 8 Shipment St., Toronto, Ont., Active
R. L. SUTHERLAND, 17 Bowmore Rd., Toronto, Ont., Active
W. A. TROTT, c/o Lighting Materials Co., 803 Erin St., Winnipeg, Manitoba, Associate

Waterbury Branch

CLINTON W. DAVISSON, Atkins St., Middletown, Conn., Associate
EDWARD J. GARLAND, 31 New St., Naugatuck, Conn., Associate

APPLICATIONS

Chicago Branch

R. V. MINER, 4068 Western Ave., Western Springs, Ill., Associate

Cincinnati Branch

ERIC WISCHHUSEN, The Harshaw Chemical Co., Associate
CHARLES WISE, The Buckeye Products Co., Associate

Cleveland Branch

EUGENE W. HAUCK, Acme Plating Co., Active
JOSEPH L. UNOCIC, Ohio Crankshaft, Inc., Active

Detroit Branch

WILLIAM E. BOETTCHER, 1651 E. Grand Blvd., Detroit, Mich., Associate
JACK LAWSON, 1951 E. Ferry, Detroit, Mich., Associate

Hartford Branch

LUCIAN A. ANDREWS, R.F.D. No. 2, New Britain, Conn.
BURTON S. HUBBELL, 141 Whiting St., Plainville, Conn.

Newark Branch

HOWARD F. JOHNSON, Lotte Chemical Co., Inc., Paterson, N. J., Associate
VICTOR GEORGE MICHAELS, Diversey Corp., Chicago, Ill., Associate
WILLIAM H. HAYFORD, JR., United States Rubber Co., Passaic, N. J., Associate

New York Branch

BENJAMIN GALLO, Farrand Optical Co., New York, N. Y., Active
WM. F. GOURZONG, Electro Chemical Engraving Co., New York, N. Y., Active

Philadelphia Branch

EMILIO J. MARRERO, Associate

TRANSFERS

The following members of the Binghamton Branch have been transferred to the Syracuse Branch:

LESTER A. BARBER	AUSTIN F. FLETCHER	WM. MAHER
F. W. CARPENTER	JOSEPH W. HAINES	JOSH R. PHILLIPS
L. C. CONRADI	FLOYD W. KENYON	NORMAN F. PRINCE
JOHN R. CONWAY	DUANE G. LAWTON	L. RAY SOPER
	HARRY M. HERLIKOFER	

R. B. POTTER, from Detroit Branch to Buffalo Branch
BARNET OSTROW, from New York Branch to Waterbury Branch
JOHN VITALE, from Binghamton Branch to Buffalo Branch
JACK HARNETT, from Binghamton Branch to New Haven Branch

RESIGNATIONS

E. J. PADDOCK, Detroit Branch

DEATHS

WILLIAM C. DAKE, Grand Rapids Branch
F. W. SHULKE, Chicago Branch

SUSPENSIONS

ISADORE C. ROY, Detroit Branch. Dropped.
HAROLD FISHER, Lancaster Branch
P. H. STAUB, Newark Branch
BURT F. BRADDOCK, Cleveland Branch
GORDON B. SCHAUFELE, Cleveland Branch
FRANCIS B. HENRY, Cleveland Branch

MEMBERSHIP CHART

BRANCH	May 1942	Change in Membership	Percent Change
SYRACUSE	31	+10½	+33.9
CINCINNATI	42	+13	+30.9
CLEVELAND	81	+24	+29.7
INDIANAPOLIS	48	+10	+20.8
BALT.-WASHINGTON	82	+15	+18.3
TORONTO	87	+14	+16
BUFFALO	55	+ 8	+14.5
MONTREAL	44	+ 6	+13.6
NEWARK	156	+19	+12.2
WATERBURY	97	+ 8½	+ 8.8
ROCHESTER	80	+ 6	+ 8
CHICAGO	258	+18	+ 7
PITTSBURGH	52	+ 3	+ 5.7
SAN FRANCISCO	46	+ 1	+ 2.2
PROV.-ATTLEBORO	49	+ 1	+ 2
*BINGHAMPTON	...	...	...
HARTFORD	67	— 3½	— .5
DETROIT	277	— 2½	— .9
BOSTON	118	— 1½	— 1.3
LOS ANGELES	128	— 2	— 1.6
NEW HAVEN	105	— 2	— 2
NEW YORK	139	— 3	— 2.2
MILWAUKEE	97	— 2½	— 2.6
DAYTON	99	— 3	— 3
BRIDGEPORT	80	— 2½	— 3.1
GRAND RAPIDS	87	— 3½	— 4
LANCASTER	44	— 2	— 4.5
SPRINGFIELD	72	— 3½	— 4.8
ST. LOUIS	82	— 4	— 4.8
PHILADELPHIA	142	—11	— 8.6
ANDERSON	38	— 5½	—14.5
TOLEDO	46	— 8	—17.4

*Binghampton Branch has suspended. Members have been transferred to other Branches.

MEMBERSHIP — May 1st, 1942 = 2845
MEMBERSHIP — April, 1943 = 2934
GAIN IN MEMBERSHIP = 89
Percent of Gain = 3.1%

BUYERS' GUIDE

ABRASIVES

Divine Brothers Co., Utica, N. Y.
Harrison & Co., Haverhill, Mass.
Lasalco, Inc., St. Louis, Mo.
Lea Mfg. Co., Waterbury, Conn.
Norton Company, Worcester, Mass.
Roberts Rouge Co., Stratford, Conn.

ACTIVATED CARBONS

Darco Corporation, New York City
Industrial Chemical Sales, New York City

ALKALI CLEANING COMPOUNDS

Detroit Rex Products Co., Detroit, Mich.
Gumm, Frederick, Chemical Co., Inc., Kearny, N. J.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Lasalco, Inc., St. Louis, Mo.
MacDermid, Inc., Waterbury, Conn.
Magnus Chemical Co., Garwood, N. J.
Magnuson Products Corp., Brooklyn, N. Y.
Oakite Products Inc., New York City
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Wyandotte Chemicals Corp., Wyandotte, Mich.

ANODES, ACIDS AND SALTS

Apothecaries Hall Co., Waterbury, Conn.
du Pont, E. I., de Nemours & Co., Inc., Wilmington, Del.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Harshaw Chemical Co., The, Cleveland, Ohio
Lasalco, Inc., St. Louis, Mo.
Preciment Laboratories, New York City
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

ANODES, ACIDS AND SALTS

Stevens, Frederic B., Inc., Detroit, Mich.
Stutz, George A., Mfg. Co., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.

ANODES—CHROMIUM PLATING

Hanson-Van Winkle-Munning Co., Matawan, N. J.
Harshaw Chemical Co., The, Cleveland Ohio
Heil Engineering Company, Cleveland Ohio
Lasalco, Inc., St. Louis, Mo.
McGean Chemical Co., Cleveland, Ohio
Seymour Mfg. Co., Seymour, Conn.
Stevens, Frederic B., Inc., Detroit, Mich.
Storts Welding Co., Meriden, Conn.
Stutz, George A., Mfg. Co., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.
United States Stoneware Co., The, Akron, Ohio.

ANODES—COPPER

American Brass Co., Waterbury, Conn.
du Pont, E. I., de Nemours & Co., Inc., Wilmington, Del.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Harshaw Chemical Co., The, Cleveland, Ohio
Lasalco, Inc., St. Louis, Mo.
McGean Chemical Co., Cleveland, Ohio
Seymour Mfg. Co., Seymour, Conn.
Stevens, Frederic B., Detroit, Mich.
Stutz, George A. Mfg. Co., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.

ANODES—ELECTRIC CLEANER

Lasalco, Inc., St. Louis, Mo.
Storts Welding Co., Meriden, Conn.
Stutz, George A., Mfg. Co., Chicago, Ill.

BUYERS' GUIDE

ANODES—NICKEL

Seymour Mfg. Co., Seymour, Conn.

ANODES—ZINC

du Pont, E. I., de Nemours & Co., Inc., Wilmington, Del.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Harshaw Chemical Co., The, Cleveland, Ohio
Lasalco, Inc., St. Louis, Mo.
Meaker Company, The, Chicago, Ill.
Seymour Mfg. Co., Seymour, Conn.
Stevens, Frederic B., Inc., Detroit, Mich.
Stutz, George A., Mfg. Co., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.

BALL ANODES

du Pont, E. I., de Nemours & Co., Inc., Wilmington, Del.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Lasalco, Inc., St. Louis, Mo.
Stutz, George A., Mfg. Co., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.

BUFFS AND BUFFING COMPOSITIONS

Advance Polishing Wheels, Inc., Chicago, Ill.
Apothecaries Hall Co., Waterbury, Conn.
Burns, E. Reed, Corp., Brooklyn, N. Y.
Divine Brothers Co., Utica, N. Y.
Gumm, Frederick, Chemical Co., Inc., Kearny, N. J.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Harrison & Co., Haverhill, Mass.
L'Hommedieu, Chas. F., & Sons, Co., Chicago, Ill.
Lasalco, Inc., St. Louis, Mo.
Lea Mfg. Co., Waterbury, Conn.
MacDermid, Inc., Waterbury, Conn.
Matchless Metal Polish Co., Glen Ridge, N. J., and Chicago, Ill.
Puritan Mfg. Co., Waterbury, Conn.
Roberts Rouge Co., Stratford, Conn.
Stevens, Frederic B., Detroit, Mich.
The Buckingham Products Co., Detroit, Michigan

BUFFS AND BUFFING COMPOSITIONS

Stutz, George A., Mfg. Co., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.
United Laboratories, Linden, N. J.
The Buckingham Products Co., Detroit, Michigan

BURNISHING BARRELS AND BALLS

Abbott Ball Co., Hartford, Conn.
Baker, M. E., Co., Cambridge, Mass.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Lasalco, Inc., St. Louis, Mo.
Magnuson Products Corp., Brooklyn, N. Y.
Storts Welding Co., Inc., Meriden, Conn.

BURNISHING COMPOUNDS

Ford, J. B., Co., The, Detroit, Mich.
Gumm, Frederick, Chemical Co., Inc., Kearny, N. J.
Lasalco, Inc., St. Louis, Mo.
Magnus Chemical Co., Garwood, N. J.
Oakite Products, Inc., New York City

CADALYTE PLATING MATERIALS "CARBONATE REMOVER"

du Pont, E. I., de Nemours & Co., Inc., Wilmington, Del.
Lasalco, Inc., St. Louis, Mo.

CADMIUM SERVICE

Hanson-Van Winkle-Munning Co., Matawan, N. J.
Udylte Corp., The, Detroit, Mich.

CADUX MATERIALS

Hanson-Van Winkle-Munning Co., Matawan, N. J.

CEMENT—GLUE SUBSTITUTE

Harrison & Co., Haverhill, Mass.

BUYERS' GUIDE

CEMENT POLISHING WHEEL

Divine Brothers Co., Utica, N. Y.
Harrison & Co., Haverhill, Mass.
Lasalco, Inc., St. Louis, Mo.
Lea Mfg. Co., The, Waterbury, Conn.

CHROMIUM SERVICE

Hanson-Van Winkle-Munning Co., Matawan, N. J.
United Chromium, New York City

CLEANERS AND CHEMICALS

Apothecaries Hall Co., Waterbury, Conn.
Blakeslee, G. S., & Co., Chicago, Ill.
Detroit Rex Products Co., Detroit, Mich.
du Pont, E. I., de Nemours & Co., Inc., Wilmington, Del.
Enthone Co., New Haven, Conn.
Ford, J. B., Co., Wyandotte, Mich.
Gumm, Frederick, Chemical Co., Inc., Kearny, N. J.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Harshaw Chemical Co., The, Cleveland, Ohio
Lasalco, Inc., St. Louis, Mo.
Lea Mfg. Co., The, Waterbury, Conn.
MacDermid, Inc., Waterbury, Conn.
Magnus Chemical Co., Garwood, N. J.
Magnuson Products Corp., Brooklyn, N. Y.
McGean Chemical Co., The, Cleveland, Ohio
Meaker Company, The, Chicago, Ill.
Merck & Co., Inc., Rahway, N. J.
Norton Co., Worcester, Mass.
Oakite Products, Inc., New York City
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Puritan Mfg. Co., Waterbury, Conn.
Stevens, Frederic B., Inc., Detroit, Mich.
Sulphur Products Co., Greensburg, Pa.
Udylite Corp., The, Detroit, Mich.
Zialite Corporation, Worcester, Mass.

COILS—PLATING TANKS

Heil Engineering Company, Cleveland, Ohio
Lasalco, Inc., St. Louis, Mo.
Storts Welding Co., Meriden, Conn
United States Stoneware Co., The, Akron, Ohio.

DEGREASERS

Blakeslee, G. S., & Co., Chicago, Ill.
Detroit Rex Products Co., Detroit, Mich.
Mechanical Process, South Orange, N. J.
Phillips Mfg. Co., Chicago, Ill

EQUIPMENT

Alsop Engineering Corp., Milldale, Conn.
Blakeslee, G. S., & Co., Chicago, Ill.
Ceilcote Company, Cleveland, Ohio
Detroit Rex Products Co., Detroit, Mich.
Divine Brothers Co., Utica, N. Y.
Gumm, Frederick, Chemical Co., Inc., Kearny, N. J.
Hammond Machinery Builders, Kalamazoo, Mich.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Heil Engineering Co., Cleveland, Ohio
Industrial Filter & Pump Mfg. Co., Chicago, Ill.
Lasalco, Inc., St. Louis, Mo.
Lea Mfg. Co., The, Waterbury, Conn.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.
Meaker Co., The, Chicago, Ill.
Mechanical Process Company, South Orange, N. J.
Miller, J. C., Company, Grand Rapids, Mich.
Paasche Airbrush Company, Chicago, Ill.
Packer Machine Co., The, Meriden, Conn.
Phillips Mfg. Co., Chicago, Ill.
Stevens, Frederic B., Inc., Detroit, Mich.
Storts Welding Co., Meriden, Conn.
Stutz, George A., Mfg. Co., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.
United Laboratories, Linden, N. J.
United States Stoneware Co., The, Akron, Ohio.

LEAD LINED TANKS

Hanson-Van Winkle-Munning Co., Matawan. N. J.
Heil Engineering Company, Cleveland, Ohio
Lasalco, Inc., St. Louis, Mo.
Storts Welding Co., Meriden, Conn.
Udylite Corp., The, Detroit, Mich.
United States Stoneware Co., The, Akron, Ohio.

BUYERS' GUIDE

MEAKER PROCESS GALVANIZING

Meaker Company, The, Chicago, Ill.

METAL LACQUERS AND FINISHES

Alrose Chemical Co., Providence, R. I.
Atlas Powder Co., Zapon Div., Stamford, Conn.
Egyptian Lacquer Mfg. Co., New York City
Heatbath Corporation, Springfield, Mass.
Maas & Waldstein Co., Newark, N. J.
New Wrinkle, Inc., Dayton, Ohio
Preciment Laboratories, New York City

METAL WORKING LUBRICANTS

Magnus Chemical Co., Garwood, N. J.
Oakite Products, Inc., New York City

OXIDIZING AGENTS

Lasalco, Inc., St. Louis, Mo.
Mitchell-Bradford Chemical Co., Bridgeport, Conn.
Puritan Mfg. Co., Waterbury, Conn.
Sulphur Products Co., Greensburg, Pa.

PLATING BARRELS

Hanson-Van Winkle-Munning Co., Matawan, N. J.
Lasalco, Inc., St. Louis, Mo.
Lea Mfg. Co., The, Waterbury, Conn.
Stevens, Frederic B., Inc., Detroit, Mich.
Stutz, George A., Mfg. Co., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.

PLATING TANKS

Hanson-Van Winkle-Munning Co., Matawan, N. J.
Heil Engineering Company, Cleveland, Ohio
Lasalco, Inc., St. Louis, Mo.
Stevens, Frederic B., Inc., Detroit, Mich.
Storts Welding Co., Meriden, Conn.

PLATING TANKS

Stutz, George A., Mfg. Co., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.
U. S. Stoneware Co., New York City

POLISHING LATHES

Baker, M. E., Co., Cambridge, Mass.
Divine Brothers Co., Utica, N. Y.
Gumm, Frederick, Chemical Co., Inc., Kearny, N. J.
Hammond Machinery Builders, Kalamazoo, Mich.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu, Chas. E., & Sons Co., Chicago, Ill.
Stevens, Frederic B., Detroit, Mich.
Stutz, George A., Mfg. Co., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.

PLATING—PRECIOUS METALS

Baker & Co., Inc., Newark, N. J.
Merck & Co., Rahway, N. J.
Spectranome, New York City

POLISHING WHEELS AND MATERIALS

Advance Polishing Wheels, Inc., Chicago, Ill.
Baker, M. E., Co., Cambridge, Mass.
Burns, E. Reed, Brooklyn, N. Y.
Divine Brothers Co., Utica, N. Y.
Gumm, Frederick, Chemical Co., Inc., Kearny, N. J.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu, Chas. E., & Sons Co., Chicago, Ill.
Matchless Metal Polish Co., The, Glen Ridge, N. J., and Chicago, Ill.
Miller, J. C., Co., Grand Rapids, Mich.
Puritan Mfg. Co., Waterbury, Conn.
Roberts Rouge Co., Stratford, Conn.
Stevens, Frederic B., Detroit, Mich.
Stutz, George A., Mfg. Co., Chicago, Ill.
The Buckingham Products Co., Detroit, Michigan
Udylite Corp., The, Detroit, Mich.
United Labortories, Linden, N. J.

BUYERS' GUIDE

ROUGES

Divine Brothers Co., Utica, N. Y.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Harrison & Co., Haverhill, Mass.
Lasalco, Inc., St. Louis, Mo.
Matcheless Metal Co., Glen Ridge, N. J.
Roberts Rouge Co., Stratford, Conn.
Stevens, Frederic B., Detroit, Mich.
The Buckingham Products Co., Detroit, Michigan
Udylite Corp., The, Detroit, Mich.

RUBBER-LINED TANKS

Heil Engineering Co., Cleveland, Ohio
Lasalco, Inc., St. Louis, Mo.
Storts Welding Co., Meriden, Conn.
United States Stoneware Co., The, Akron, Ohio.

SOAPS

Hanson-Van Winkle-Munning Co., Matawan, N. J.
Lea Mfg. Co., The, Waterbury, Conn.
MacDermid, Inc., Waterbury, Conn.
Magnus Chemical Co., Garwood, N. J.
Magnuson Products Corp., Brooklyn, N. Y.
Oakite Products, Inc., New York City
Udylite Corp., The, Detroit, Mich.

SOLUTION CONTROL METHODS

du Pont, E. I., de Nemours & Co., Inc., Wilmington, Del.
Hanson-Van Winkle-Muning Co., Matawan, N. J.
Lasalco, Inc.. St. Louis, Mo.

SOLVENTS–DEGREASING

Blakeslee, G. S., & Co., Chicago, Ill.
Detroit Rex Products Co., Detroit, Mich.
Lasalco, Inc., St. Louis, Mo.
Lea Mfg. Co., The, Waterbury, Conn.
MacDermid, Inc., Waterbury, Conn.
Magnus Chemical Co., Garwood, N. J.
Mechanical Process Co., South Orange, N. J.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Phillips Mfg. Co., Chicago, Ill.
Westvaco Chlorine Products Corp., New York, N. Y.

SOLVENTS RECOVERED

A. B. C. Chemical Co., Waterbury, Conn.

STRIPPING COMPOUNDS

Detroit Rex Products Co., Detroit, Mich.
du Pont, E. I., de Nemours & Co., Inc., Wilmington, Del.
Gumm, Frederick, Chemical Co., Inc., Kearny, N. J.
MacDermid, Inc., Waterbury, Conn.
Magnus Chemical Co., Garwood, N. J.
Magnuson Products Corp., Brooklyn, N. Y.
Oakite Products, Inc.. New York City
Sulphur Products Company, Inc., Greensburg, Pa.

TESTING INSTRUMENTS

American Instrument Co., Silver Spring, Md.
du Pont, E. I., de Nemours & Co., Inc., Wilmington, Del.
Harshaw Chemical Co., The, Cleveland, Ohio
Industrial Filter & Pump Mfg. Co., Chicago, Ill.
Kocour Co., Chicago, Ill.
Lasalco, Inc., St. Louis, Mo.

TUMBLING BARRELS

Abbott Ball Co., Hartford, Conn.
Baker, M. E., Co., Cambridge, Mass.
Lasalco, Inc., St. Louis, Mo.
Storts Welding Co., Meriden, Conn.

UDYLITE CADMIUM SERVICE

MacDermid, Inc., Waterbury, Conn.
Udylite Corp., The, Detroit, Mich.

USED EQUIPMENT

Baker, M. E., Co., Cambridge, Mass.

WASHERS–METAL PARTS

Blakeslee, G. S., & Co., Chicago, Ill.
Detroit Rex Products Co., Detroit, Mich.

BRANCH DIRECTORY

ANDERSON meets second Tuesday of every month at 7:30 p.m., at the Y. M. C. A. Anderson, Indiana. Secretary-Treasurer, E. L. McKinney, 2014 Fairview St., Anderson, Ind.

BALTIMORE-WASHINGTON meets at the Telford Buffeteria, 14th and Decatur Sts., N.W. Washington, D. C., the first Saturday of each month. Secretary-Treasurer, Abner Brenner, 6509 Fulton St., Chevy Chase, Md.

BINGHAMTON Secretary-Treasurer, Austin Fletcher, 406 Conklin Ave., Binghamton, N. Y.

BOSTON meets at the Hotel Statler, Boston, Mass., first Thursday each month. Secretary, A. W. Garrett, 77 Neponset Ave., Dorchester, Mass.

BRIDGEPORT meets first Friday of each month at Chamber of Commerce Rooms, Stratfield Hotel, Secretary-Treasurer, Joseph G. Sterling, 134 Colony St., Bridgeport, Conn.

BUFFALO meets second Friday of each month at Hotel Statler; Buffalo, N. Y. Secretary J. C. Mays, c/o Carborundum Co., Niagara Falls, N. Y.

CHICAGO meets second Friday of each month at 8 p.m., Atlantic Hotel, 316 S. Clark St. Secretary, J. W. Hanlon, 3004 N. Whipple St., Chicago, Ill.

CINCINNATI meets on Fourth Thursday of each month at 8 p.m., at Hotel Gibson, Cincinnati, Ohio. Secretary, Alcide E. Foreman, Rt. 9, Van Zandt Road, Box 313, Cincinnati, Ohio.

CLEVELAND meets first Saturday of each month at Cleveland Hotel. Secretary-Treasurer, G. B. Svenson, c/o Plater Supply, 2059 Hamilton Ave., Cleveland, Ohio.

DAYTON meets second Friday of each month at the Engineers Club, Dayton, Ohio. Secretary-Treasurer, W. M. Durnbaugh, R. R. 4 Xenia, Ohio.

DETROIT meets the first Friday of each month at the Hotel Statler. Acting Secretary-Treasurer, Wright M. Wilson, 1570 Anita Ave., Grosse Point Woods, Mich.

GRAND RAPIDS meets second Friday of each month, 7:30 p.m., at the Browning Hotel. Secretary-Treasurer, C. E. Abel, 11 Scribner Ave., N.W., Grand Rapids, Mich.

HARTFORD meets third Monday of each month alternately at Hartford Electric Light Company, Hartford and at the Elks Club, corner South and Main Sts., Bristol, Conn. Special meetings are held at the New Britain Trade School, New Britain, Conn. Secretary-Treasurer, Kenneth Bellinger, 16 Mountain View Drive, Newington, Conn.

INDIANAPOLIS meets at the Hotel Riley, the first Wednesday of each month. Secretary-Treasurer, W. W. Cothran, 5242 Boulevard Place, Indianapolis, Ind.

LANCASTER meets second Friday of each month at 8 p.m., at Thaddeus Stevens Industrial School, Lancaster, Pa. Secretary-Treasurer, W. H. Fordney, 603 Marietta Ave., Lancaster, Pa.

LOS ANGELES meets second Wednesday of each month at 6:30 p.m., at the Elks Club, 607 S. Parkview, Los Angeles. Secretary-Treasurer, C. C. McLaren, 2236 Charnwood, Los Angeles, Calif.

MILWAUKEE meets first Friday of each month at Republican Hotel. Secretary-Treasurer, James Durnford, 2552 N. Weil St., Milwaukee, Wis.

MONTREAL meets first Monday of each month at Mount Royal Hotel, Montreal, Quebec, Canada. Secretary-Treasurer, Eugene Feeley, 8271 Foucher St., Montreal, Quebec.

NEWARK meets first and third Friday of each month at Hotel Robert Treat, Newark, N. J., at 8 p.m. Secretary-Treasurer, George Wagner, 1130 So. Long Ave., Hillside, N. J.

NEW HAVEN meets the first Tuesday of each month at Sterling Chemistry Laboratory, Yale University. Secretary-Treasurer, Walter Lynch, 110 Peck St., New Haven, Conn.

NEW YORK meets second and fourth Fridays of each month, in the Hotel Pennsylvania, 7th Ave. and 33rd St., New York City, N. Y. Secretary-Treasurer, Franklyn MacStoker, 25 Princeton St., Garden City, L. I., N. Y.

PHILADELPHIA meets fourth Friday of each month, in the Harrison Laboratory Building, University of Pennsylvania, 34th and Spruce Sts. No regular meeting in Nov., will meet Dec. 11th. Secretary, Paul Mentzer, 408 Princeton Ave., Philadelphia, Pa.

PITTSBURGH meets first Thursday of each month, at 8 p.m. at the Bureau of Mines Building, 4800 Forbes St., Pittsburgh, Pa. Secretary-Treasurer, Frank Keller, 1102 Hiland Ave., Corapolis, Pa.

PROVIDENCE-ATTLEBORO meets at the Providence Biltmore Hotel the third Monday of each month. Secretary-Treasurer, Frederick E. Allen, 260 Fair Street, Edgewood Station, R. I.

ROCHESTER meets third Friday of each month at the Hotel Seneca. Secretary-Treasurer, Donald C. Blum, 672 Mt. Read Blvd., Rochester, N. Y.

SAN FRANCISCO meets second Thursday of each month at Progressive Plating Works, 881-27th St., Oakland. Secretary-Treasurer, C. R. Macdonald, 5363 Shafter Ave., Oakland, Calif.

SPRINGFIELD meets the fourth Monday of each month at the Hotel Charles. Secretary-Treasurer, D. S. Hartshorn, Jr., 76 Edendale St., Springfield, Mass.

ST. LOUIS meets first Friday of each month at Central Y. M. C. A., 16th and Locust Sts., Secretary-Treasurer, C. T. McGinley, 8238 Monroe St., St. Louis, County, Mo.

SYRACUSE meets second Friday of each month at Bowne Hall, Syracuse University, Syracuse, N. Y. Secretary, George Simmons, 309 Park Ave., Herkimer, N. Y.

TOLEDO meets first Thursday of each month, in the office of Mr. Spanolis. Secretary, Gaston Bergeman, 718 Howland St., Fremont, Ohio.

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WATERBURY meets second Friday of the month at Elton Hotel. Secretary-Treasurer, Spencer L. Henn, Apothecaries Hall Co., Waterbury, Conn.

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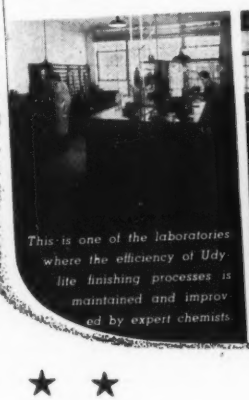
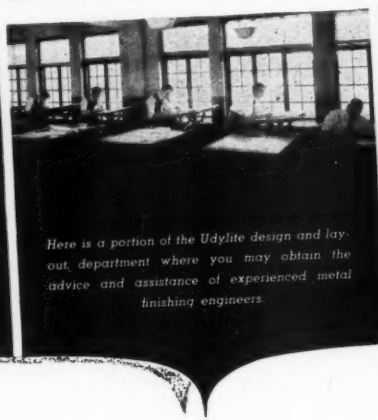
UDYLITE

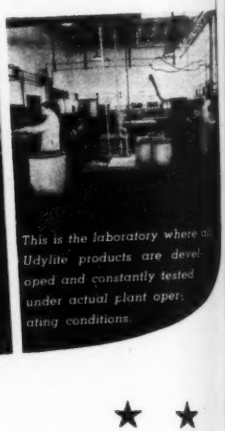
HEADQUARTERS FOR ELECTROPLATING, POLISHING AND ANODIZING INFORMATION



This is one of the laboratories where the efficiency of Udylite finishing processes is maintained and improved by expert chemists.



Here is a portion of the Udylite design and layout department where you may obtain the advice and assistance of experienced metal finishing engineers.



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CONSTITUTION

PREAMBLE

Name, Object and Divisions

Paragraph 2

The objects of this society shall be the improvement and dissemination of the art and science of electrodeposition and *its allied arts;* the development of a co-operative spirit of friendship and mutual assistance among its members, and the increase of knowledge of those occupied in the numerous applications of electroplating *and the allied arts.*

Paragraph 3

There shall be a "Supreme Society" which shall consist of members duly elected according to the Constitution and By-Laws, and "Branches" of the American Electroplaters' Society duly organized and affiliated under the provisions and in accordance with the laws of the Supreme Society. In the Constitution and By-Laws the word "Society" refers to the Supreme Society, and the word "Branch" referts to a Local Society. *The words "allied arts" shall be construed to mean Anodizing, Chemical and Organic Finish.*

Part II. Branch Societies.

ARTICLE II. MEMBERSHIP

Sect. 2. Active Members:

These shall consist of foreman electroplaters, elected by a majority vote. Each applicant shall be required to furnish proof that he has been actively engaged in electroplating *or the allied arts* for at least five (5) years; one (1) year of which he must have acted in the capacity of a foreman plater or supervisor. He may be required to pass such examination in the *coating* of metals as may be deemed advisable by the Branch. A foreman plater or supervisor is hereby defined as an executive engaged in supervising and directing the personnel and production of a *plant or department engaged in electroplating or the allied arts.*

Sect. 3. Associate Members:

These shall consist of any persons not qualified for active membership who are engaged in any phase of the *industry of electroplating or its allied arts* and interested in the aims and welfare of this Society. Associate members shall be elected by a majority vote, and shall have all the privileges of an active member except being eligible to election to the Supreme Society.

J. G. STERLING,
Secretary-Bridgeport Branch

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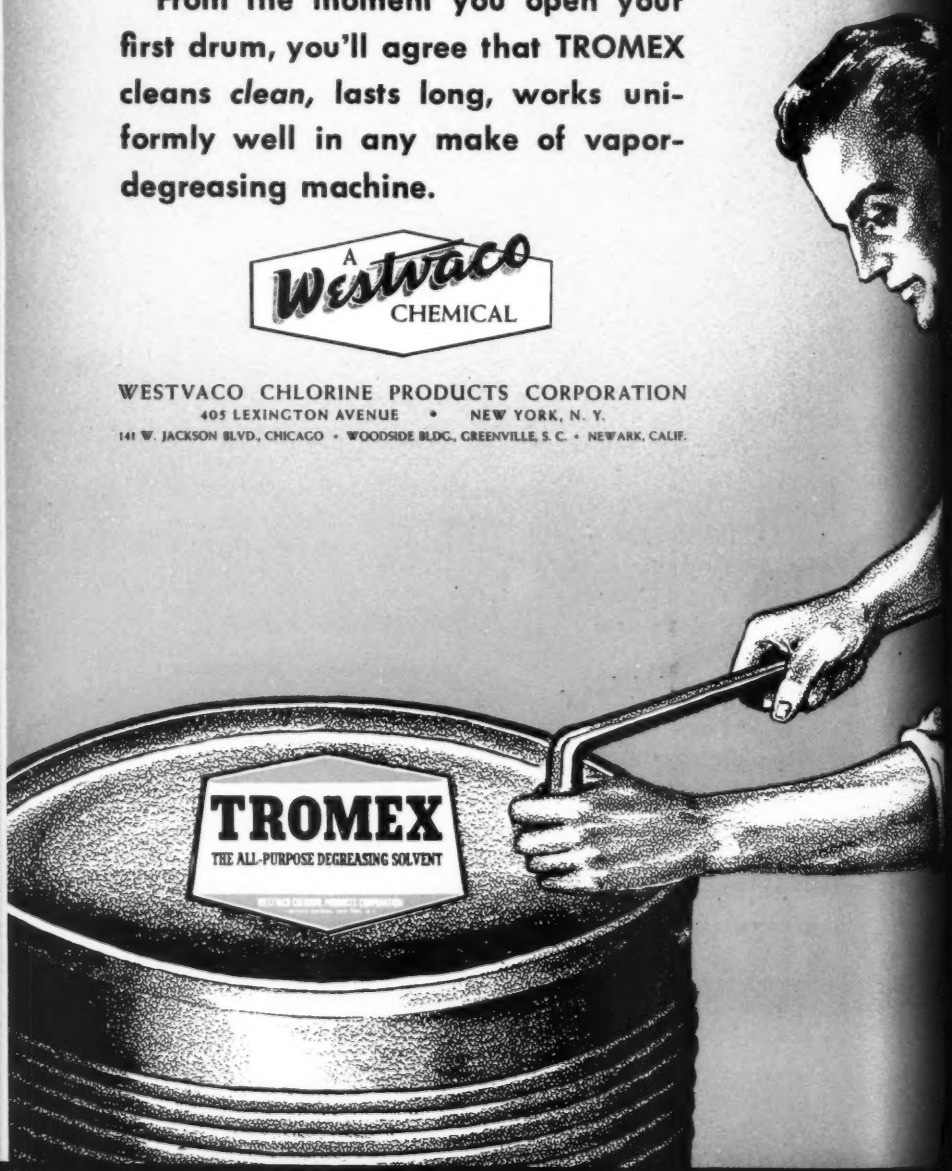

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By M. R. CALDWELL
Membership Chairman

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